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ABSTRACT

The second volume of test items in the Science Library of Test Items is intended as a resource to assist teachers in implementing and evaluating science courses in the first 4 years of Australian secondary school. The items were selected from questions submitted to the School Certificate Development Unit by teachers in New South Wales. Only the content and processes which can be tested easily with multiple choice questions are covered. Subject areas include biology, chemistry, physics, geology, health, astronomy, and the scientific and experimental methodologies. Many questions are based on diagrams, tables, and other illustrations. The present volume also includes an index of the content and processes covered by items in the first two volumes of the Science Library of Test Items. (CM)

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SCIENCE

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LIBRARY OF TEST ITEMS

VOLUME TWO

INTRODUCTION

With this issue of the Library of Test Items, schools will have received all of the *acceptable* items which were submitted to the School Certificate Development Unit prior to May, 1977.

Many of the rejected items have been rewritten, and many new items have been received. These will be placed in a pre-test programme which is to be run late in 1978. The items from that programme should be released by about May, 1979.

This issue includes an index of the content and processes covered by items in the first two volumes of the Item Collection. This index is intended to be used as an information storage and retrieval system, and is not intended to imply any assumptions about curriculum practice. The content and processes covered are only those which can be tested easily with multiple choice questions. The terminology used is aimed at the professional teacher, not at the student.

Inevitably there will be content, topics, concepts and skills which are widely taught, and which are either unrepresented or under-represented in this collection. The index should help to identify these areas. Teachers noting discrepancies between the item collection and what they teach should indicate these discrepancies to:

The Subject Officer (Science),
Directorate of Studies,
G.P.O. Box 33,
SYDNEY. 2001.

It should be noted that the Library of Test Items project also includes the Mastery Test collection, and is now being expanded to include free response testing. Teachers who are unfamiliar with these materials should also contact the above address.

ACKNOWLEDGEMENTS

More than fifty teachers have been involved in developing material for inclusion in the Science Library of Test Items.

Those who have been most heavily involved in reviewing, rewriting, editing and selecting items for the two volumes are:

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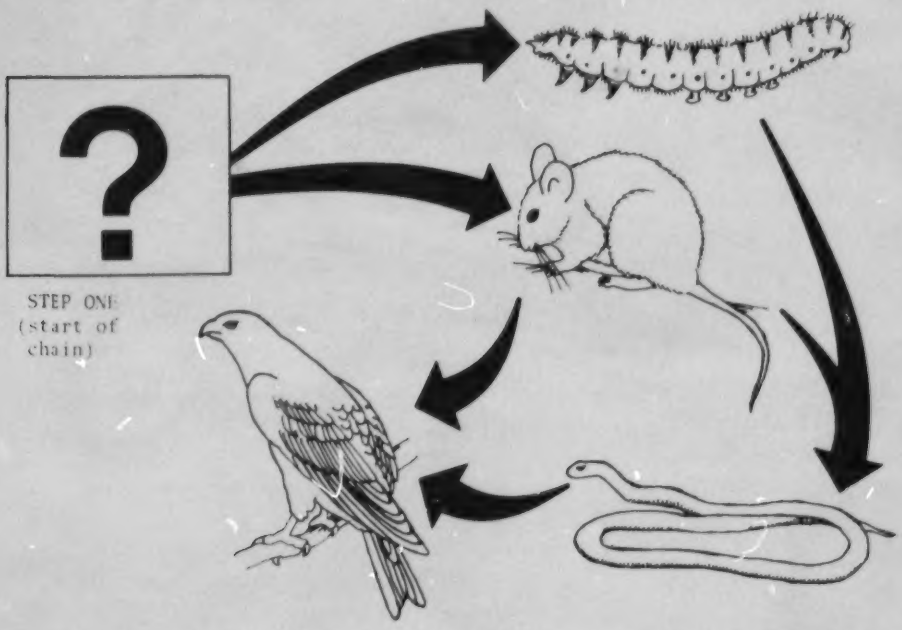
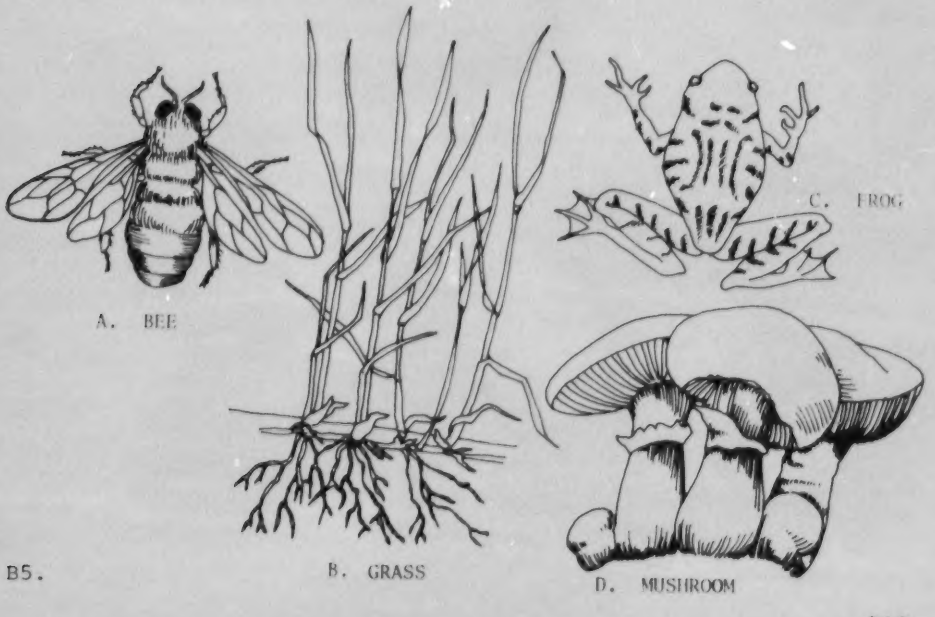
The diagram below is a partly completed food chain.



Of the organisms shown <u>below</u> pick out the one which best fits into the empty square.



B5.

Specimens of three plants P, Q and R are grown under different conditions, giving the following results

PLANT	OCCASIONAL WATERING	REGULAR WATERING	FREQUENT WATERING
P	WILTS	GROWS WELL	GROWS POORLY
Q	GROWS WELL	GROWS WELL	DIES
R	DIES	WILTS	GROWS WELL

From this we can conclude that the plants grow in the following environments

	P	Q	R
A.	DESERT	FOREST	RAINFOREST
B.	RAINFOREST	DESERT	FOREST
C.	FOREST	DESERT	RAINFOREST
D.	RAINFOREST	FOREST	DESERT

C3. 320

Biological control of a pest means using another animal or plant to kill it. This means that the controlling species is not native to the area and must be introduced. The main reason why biological control is used in many cases is that

A. if used correctly the controlling species attacks only the pest species.
B. not all of the pest species will be killed.
C. no damage is done to the rest of the environment.
D. it works more quickly than poisonous chemicals.

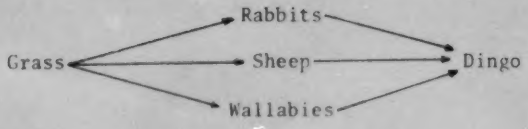
C2. 321

Modern biology is relying more and more on the biological control of pests rather than spraying or baiting.

The term biological control means that the pest is being controlled by

A. an animal that preys on it.
B. injections of special drugs.
C. burning forests where the pests live.
D. shooting with special paralysing darts.

A3. 322



The above diagram shows part of the food web for sheep breeding areas of Australia.

A possible conclusion from this is that

A. total eradication of the dingo may create further problems.
B. without rabbits the dingo would die.
C. the dingo should be allowed to increase in numbers.
D. sheep are the main food source for dingoes.

A4. 323

Erosion is partly due to the influence of the rabbit. Although the rabbit has caused very little damage in its native country, it has caused much damage in Australia.

This is probably because

A. Australian soil is poorly held together.
B. rabbits in Australia have evolved different burrowing habits.
C. plants in Australia are more easily destroyed by rabbits than plants in other countries.
D. with plenty of food and no predators in Australia they multiplied very quickly.

D3. 324

---

15. A paleontologist finds a fossil skeleton with the following features:

1. well-developed incisors and molars but no canines.
2. elongated leg and foot bones with two toes on each foot.

He could most correctly conclude that the animal was a

A. tree-climbing herbivore.
B. fast-running carnivore.
C. fast-running herbivore.
D. water dwelling herbivore.

C2. 325

On the coast of Australia's tropical north, mangrove trees retain sediments about their root system, gradually raising the level of the land. If there is adequate rainfall, the mangroves are gradually replaced by ti-tree, which finally may be largely replaced by *Eucalyptus* and *Acacia*.

The description above is an example of

A. conservation.
B. succession.
C. deposition.
D. dominance.

B2. 326

Plant successions usually proceed from small to large plants. For example, from grasses to bushes to trees.

Which of the following habitats is different in that its succession of plants starts with trees?

A. Mangrove swamp.
B. Freshwater creek.
C. Sandstone rock.
D. Inland lake.

A3. 327

Which plant would be most useful to start a plant succession on sand hills rendered barren by beach mining?

A. *Acacia* shrubs.
B. *Banksia* bushes.
C. *Eucalyptus* trees.
D. *Spinifex* grass.

D3. 328

Refer to the table below which shows the death rate for mosquitoes, flies and spiders which resulted from using equal quantities of four different pesticides A, B, C and D.

Pesticide	Mosquitoes	Flies	Spiders
A	100%	90%	10%
B	40%	40%	40%
C	70%	80%	70%
D	20%	20%	90%

In your opinion, which of the pesticides A, B, C and D would be the best <u>all purpose</u> spray?

C5. 329

An insecticide spray, D.D.D. was used to kill gnat larvae living under water in a lake. Over a period of years it was found that the colony of fish-eating birds living on the lake was beginning to decrease in numbers because of D.D.D. poisoning. In the lake there lived insect larvae, plants and fish as well as birds. The most likely pathway for D.D.D. to enter the birds is

(⟶ means is eaten by)

A. plants ⟶ insect larvae ⟶ fish ⟶ bird.

B. insect larvae ⟶ plants ⟶ birds ⟶ fish.

C. plants ⟶ fish ⟶ insect larvae ⟶ birds.

D. insect larvae ⟶ birds ⟶ fish ⟶ gnats.

B4. 330

The use of DDT has been restricted in the United States. The reason for this is that DDT is

A. poisonous.
B. a cumulative poison and may affect man.
C. no longer effective on insects.
D. being replaced by more effective pesticides.

B3. 331

The Environment Protection Agency of the United States claims burping cows rank as number one source of air pollution in America! It maintains that cows burp 50 million tons of hydro-carbons into the atmosphere every year.

It is claimed that 10 cows burp enough gas annually to heat a small home.

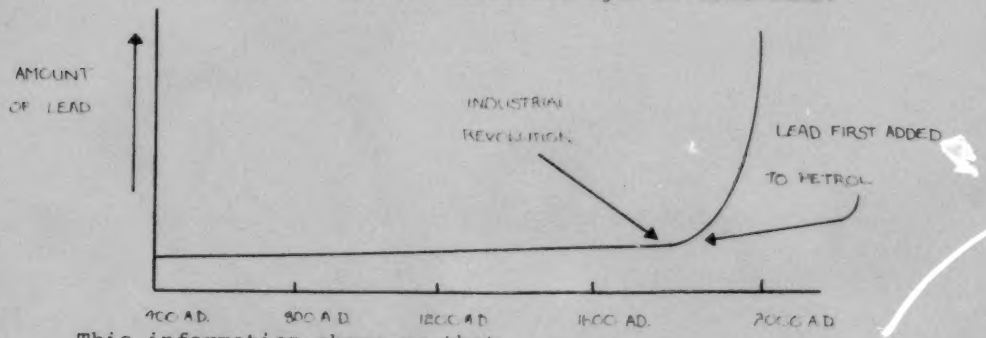
It is not known whether antacid tablets, if used to reduce the pollution, would contaminate the milk supply!

The information in the article

A. provides a way for solving the U.S. energy crisis.
B. is another argument in favour of margarine.
C. has little practical scientific application.
D. needs to be checked against results with sheep and horses.

C3. 332

Lead has been used in the past to improve the anti-knock characteristics of petrol. Following combustion of the petrol the lead must either be retained in the engine or passed out into the atmosphere as a fine aerosol.
The following graph shows the relative amount of lead found in drill cores of snow of different ages in Greenland.



This information shows us that

A. more people are buying and using cars in Greenland.
B. the spread of pollutants is much wider than was first imagined.
C. lead contamination of the atmosphere has increased markedly since its use in petrol.
D. Greenland snow is a source of lead and should be mined.

C4. 333

Water pollution levels in areas near human sewage treatment works are measured by counting the number of bacteria of the species *E. coli* in samples of the water being tested. *E. coli* is a common but harmless bacterium found in the alimentary canal of humans.
This method of measurement is used because it is known that

A. an overabundance of *E. coli* in water can cause illness in humans.
B. if *E. coli* can survive in the water other species of bacteria which may be harmful can also survive.
C. if *E. coli* are present other species which may be harmful to humans cannot survive.
D. the presence of *E. coli* indicates that the water is palatable to humans.

B3. 334

One often reads in the press that fish in various areas contain a high mercury contamination as a result of industrial pollution.

The real danger, as a result of pollution of this type, is

A. shortage of food as some fish will die.
B. mercury poisoning in people who eat the fish.
C. an upsetting of the natural balance in the area.
D. the loss of a particular species of fish due to pollution.

B3. 335

Fact 1. Gases are less soluble in hot water.
Fact 2. Animals require oxygen to live.

When considered together, these two apparently unrelated statements explain why

A. many organisms die when hot water from industry is poured into rivers.
B. Queensland lungfish have lungs.
C. on hot days we feel very tired and listless.
D. Coca-Cola fizzes less if it has been chilled before being opened.

A3. 336

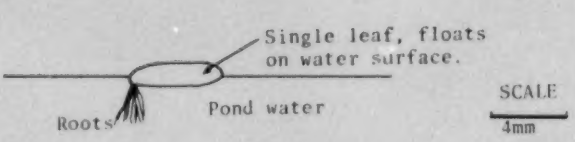
Which of the plants described below is able to survive in swampy conditions?

A. CACTUS is a succulent plant which stores moisture in its stem.
B. WATTLE has leaves which are reduced in size to prevent loss of too much water.
C. MULGA trees have a steep upward slope on their leaves and branches to collect water for the roots.
D. MANGROVES have "breathing roots" which stick up above the surface to obtain air.

337

D5.

Duckweed is a tiny plant which grows on the surface of freshwater ponds.



In an experiment, eight healthy duckweed plants were placed on the water surface of a normal-sized bucket filled with freshwater from a pond. The bucket was then placed in a room. After ten days had passed all plants were found to be dead. Of the following, the <u>most probable</u> cause of death would be

A. lack of carbon dioxide.
B. not enough room to grow.
C. the action of decomposer organisms.
D. insufficient light.

338

D3.

After rain falls in the desert, plant growth is very rapid. The plants grow quickly and complete their life cycle in a few weeks or sometimes only a few days.
This short life ensures

A. food for animals of the desert.
B. a minimum usage of water.
C. reproduction of the plants.
D. only shallow root growth.

C2.

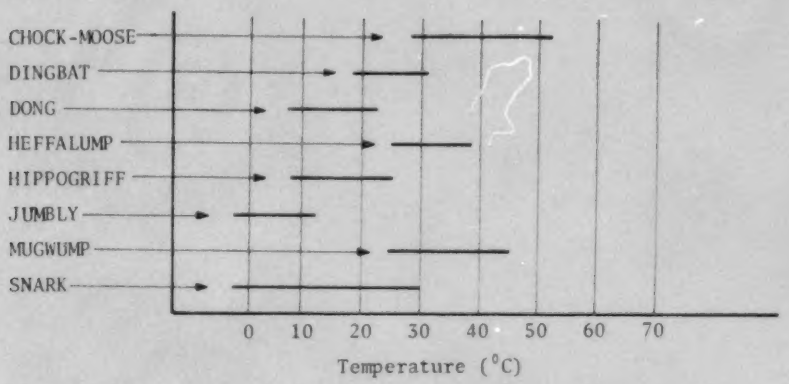
339

Of the following the animal least affected by changes in the temperature of its environment is a

A. rabbit.
B. blue-tongue lizard.
C. tree frog.
D. marine fish.

A1. 340

The next 3 questions refer to this information:



The favourable range of temperatures for some common animals.

On the basis of this information,

Which animal appears best adapted for changing temperatures?

A. Chock-moose
B. Heffalump
C. Mugwump
D. Snark

D5. 341

Which temperature range seems to be most suitable for life?

A. 0 - 10 C
B. 10 - 20 C
C. 20 - 30 C
D. 30 - 40 C

C4. 342

Which animal would be most likely to survive if a lake in a usually warm region became frozen for an extensive period of time?

A. Hippogriff
B. Jumbly
C. Mugwump
D. Snark

D3. 343

The seed shown on the right is best adapted for dispersal by

A. animals.
B. gravity.
C. water.
D. wind.

D4.

344

Some characteristics of four animals found on the planet Xenos are described below.

Animal	Number of limbs	Type of teeth	Type of feet	Eyesight
A	1	none	4 toes on foot	daytime excellent
B	2	molars and canines	2 claws each limb	day - poor night - good
C	3	canines and incisors	hoofs	very poor
D	4	molars	3 claws each limb	day - good night - poor

Which animal is most likely to be a predator?

B3.

345

The next 2 questions refer to these diagrams.

EYES

TEETH

FEET

Which combination would best suit a tree-dwelling, nocturnal, vegetarian?

A. Eyes 1, teeth 2, feet 3.
B. Eyes 2, teeth 2, feet 2.
C. Eyes 3, teeth 1, feet 1.
D. Eyes 1, teeth 3, feet 1.

346

D3

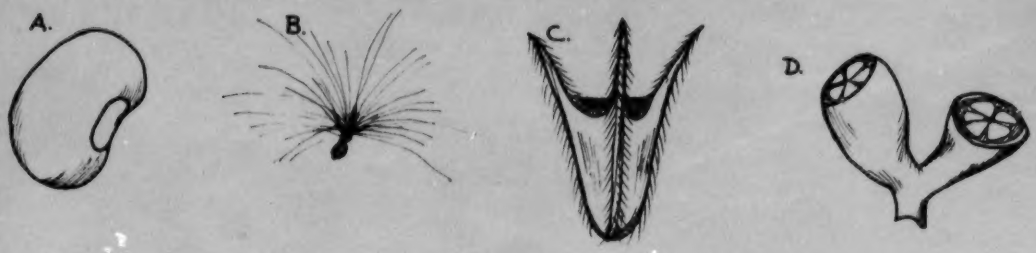
An animal which had
eyes 3, teeth 1, feet 2
would be best adapted to live in

A. desert.
B. mountains.
C. sea.
D. underground.

347

C4.

The next question refers to these drawings of seeds.



Which seed is best adapted for dispersal by the wind?

B5. 348

The gravity on the planet Xenos is equal to about twice earth's gravity, while the atmosphere is only half as dense.

Which of the birds below would be best suited for flight on Xenos?

A. Large body, small wingspan.
B. Large body, large wingspan.
C. Small body, small wingspan.
D. Small body, large wingspan.

D3. 349

Here are some characteristics of plants:

1. widespread sub-surface root system.
2. large flat leaves.
3. thick woody stem.
4. large short-lived flower.

Which characteristics would be possessed by a plant which was adapted to desert life?

A. 1 and 2.
B. 2 and 3.
C. 3 and 4.
D. 4 and 1.

D1. 350

The tapeworm is a parasite living in the intestine of man and other animals. This organism does not have a mouth nor a gut. The most likely reason for this is that it

A. absorbs food from the host organism.
B. makes its own food by photosynthesis.
C. does not require food because it is a parasite.
D. lives off its own stored food reserves.

A3. 351

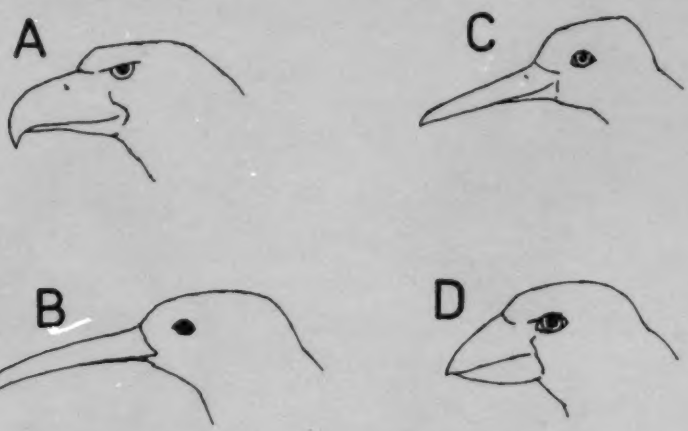
The next question refers to the information below.

	1	2	3	4	5
Body	mostly in two parts	in two parts	in three parts	many flat segments	many round segments
Number of legs	commonly ten	eight	six	one pair per segment	two pairs per segment
Method of breathing	gills	book lungs	tubes in body called tracheae		

The animals in group 1 are probably

A. centipedes.
B. crustaceans.
C. insects.
D. millipedes.

D2. 352



Which of the birds shown above would you expect to live mainly on a diet of seeds?

D5. 353

Some types of fly have evolved an appearance very similar to that of a wasp. This is an advantage to the fly because

A. they can then mate with wasps.
B. the wasps will not catch and eat them.
C. other animals will think they are wasps.
D. it allows them to eat the same food as wasps.

C1. 354

The next question refers to this table.

	1	2	3	4	5
Body	mostly in two parts	in two parts	in three parts	many flat segments	many round segments
Number of legs	commonly ten	eight	six	one pair per segment	two pairs per segment
Method of breathing	gills	book lungs	tubes in body called tracheae		

The animal groups listed in the table probably belong to phylum

A. Mollusca.
B. Echinodermata.
C. Arthropoda.
D. Chordata.

C3. 355

One of the most obvious differences between land plants and animals is that plants are fixed while most animals can move.

Plants do not have to move because they

A. are not preyed upon by other organisms.
B. grow so large.
C. do not need to obtain water.
D. carry out photosynthesis.

D4. 356

A party of zoologists travelling in South America discovered an animal which they named the "Sloth". Apart from being a very slow moving animal, they discovered it had the following characteristics:

1. a skin covering of hair;
2. gave birth to its young alive (viviparous);
3. warm-blooded;
4. breathed by means of lungs.

From these characteristics the zoologists were able to classify it as

A. an amphibian.
B. a fish.
C. a mammal.
D. a reptile

C5. 357

The next 6 questions refer to the table below.

CHARACTERISTIC	GROUPS				
	1	2	3	4	5
Appearance of skin	covered with feathers	covered with hair or fur	dry and scaly	wet and naked	scaly
Organ used for breathing	lungs			gills for larvae lungs for adults	gills
Usual method of reproduction	females lay hard-shelled eggs	females bear live young	females lay soft-shelled eggs	females lay fragile eggs with no shells	
	eggs are fertilized inside females before laying			eggs are fertilized in water after laying	
Care of young	young are fed until they can fly	young are suckled	young find their own food		
Adaptations for movement	limbs evolved from fins forelimbs of birds modified for flight				fins for swimming

Which group would best be called reptiles?

A. 1 B. 2 C. 3 D. 4

C5. 358

In which group do only the young animals live in water?

A. 1 B. 2 C. 3 D. 4

D5. 359

Which animal below would belong to group 2?

A. Emu. B. Lizard. C. Platypus D. Spider.

C4. 360

Which groups of animals are warm-blooded?

A. 1 & 2 B. 3 & 4 C. 4 & 5 D. 2 & 4

A5. 361

Which group of animals is lowest on the evolutionary scale ?

A. 2 B. 3 C. 4 D. 5

D3. 362

To which group would a whale belong?

A. 1 B. 2 C. 3 D. 4

B2. 363

The next question refers to this table.

LEVEL	NAME OF GROUP			
Kingdom	Animalia	Animalia	Animalia	Animalia
Phylum	Chordata	Chordata	Chordata	Chordata
Class	Mammalia	Mammalia	Mammalia	Mammalia
Order	Carnivora	Carnivora	Carnivora	Carnivora
Family	Felidae	Canidae	Canidae	Canidae
Genus	*Panthera*	*Canis*	*Vulpes*	*Canis*
Species	*leo*	*familiaris*	*vulpes*	*lupus*
Common Name	Lion	Dog	fox	Wolf

By using the above table which pair of animals has the most in common?

A. *Canis familiaris* and *Vulpes vulpes*.
B. *Vulpes vulpes* and *Canis lupus*.
C. *Panthera leo* and *Canis familiaris*.
D. *Canis lupus* and *Canis familiaris*.

D2. 364

LEVEL	NAME OF GROUP			
KINGDOM	ANIMALIA	ANIMALIA	ANIMALIA	ANIMALIA
PHYLUM	CHORDATA	CHORDATA	CHORDATA	CHORDATA
CLASS	MAMMALIA	MAMMALIA	MAMMALIA	MAMMALIA
ORDER	CARNIVORA	CARNIVORA	CARNIVORA	CARNIVORA
FAMILY	FELIDAE	CANIDAE	CANIDAE	CANIDAE
GENUS	*Panthera*	*Canis*	*Vulpes*	*Canis*
SPECIES	*leo*	*familiaris*	*vulpes*	*lupus*
COMMON NAME	LION	DOG	FOX	WOLF

By using the above table which pair of animals has the most in common?

A. Dog and fox.
B. Fox and wolf.
C. Lion and dog.
D. Wolf and dog.

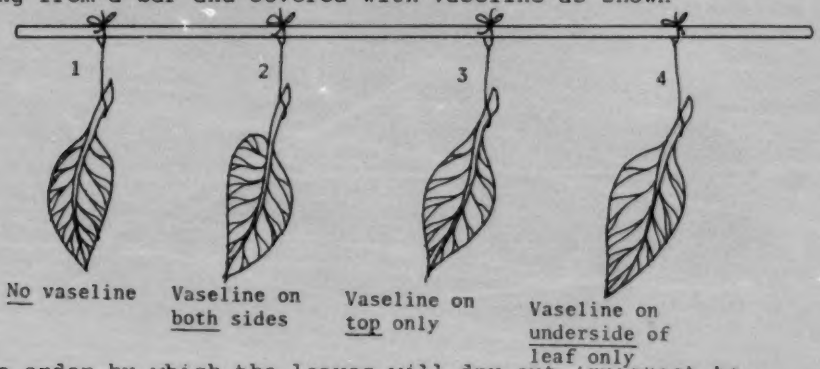
D4. 365

The chlorophyll (green colouring matter) was removed from four *Geranium* leaves of approximately equal size. The leaves were then placed in an iodine solution to test for the presence of starch. After removing and washing the leaves it was observed that:
Leaf 1 had turned black
Leaf 2 had turned brown
Leaf 3 was black near large veins, brown elsewhere
Leaf 4 was brown around the edge, black elsewhere.
Which leaf contained no starch?

A. Leaf 1. B. Leaf 2. C. Leaf 3. D. Leaf 4.

B3. 366

A student set up the following experiment involving leaves hung from a bar and covered with vaseline as shown



The order by which the leaves will dry out (quickest to slowest) is

A. 1, 2, 3, 4.
B. 2, 3, 4, 1.
C. 1, 3, 4, 2.
D. 3, 1, 4, 2.

C4. 367

Stomates are small holes in leaves through which water escapes to the atmosphere.

In which of the following environments would plants probably have fewer stomates?

A. Desert.
B. Grassland.
C. Rainforest.
D. Woodland.

A4. 368

Early growth of a plant from its seed is called

A. fertilisation.
B. germination.
C. pollination.
D. photosynthesis.

B3. 369

It was reported in the Sydney Morning Herald on Wednesday, November 20th, 1974, that students had unearthed the bones of a whale in a swamp in South Australia.

This find would give evidence for the statement that

A. the whales originally lived in swamps.
B. the area was once part of the sea.
C. whale bones make good fossils.
D. the bones had been transported inland by the aborigines.

B5. 370

Fossils show that cockroaches have hardly changed at all during the past 250 million years. The statement which best explains this piece of evidence is that

A. the theory of evolution does not apply to insects.
B. cockroaches are so dirty they have no natural predators.
C. cockroaches are very well adapted.
D. cockroaches chromosomes are so small that gene mutation cannot occur.

C4. 371

Amphibians were the major form of land dwelling vertebrate many millions of years ago. Today there are only a few remaining species. Those that have survived have done so because they

A. are poisonous and so are not eaten by other animals.
B. are well suited to the areas in which they live.
C. caused warts on people or animals who touched them.
D. are large and so are not often eaten by other animals.

B5. 372

A scientist discovered a rock containing a fossil fish at least 200 million years old. This is important because the discovery

A. increases our knowledge of geological history.
B. shows that the rock is older than the fossil fish.
C. shows that fish first appeared on earth 200 million years ago.
D. increases our knowledge of other fossils.

A3. 373

This question refers to the following passage.

"The giraffe, by its lofty stature, much elongated neck, forelegs, head and tongue, has a whole frame beautifully adapted for browsing on the higher branches of trees. It can thus obtain food beyond the reach of other hoofed animals inhabiting the same country; and this must be a great advantage to it during droughts. The Niata cattle in South America show us how a small difference in structure may make, during such periods, a great difference in preserving an animal's life. These cattle can browse as well as others on grass, but from the projection of the lower jaw they cannot, during the often recurrent droughts, browse on the twigs of trees, reeds etc., to which food the common cattle and horses are then driven: so that at these times the Niatas perish if not fed by their owners."

From: *"The Origin of Species by means of Natural Selection."*

Charles Darwin

According to Darwin, when food is plentiful the possession of a long neck is

A. an advantage.
B. a disadvantage.
C. a nuisance.
D. of no special advantage.

D3. 374

The theory of continental drift says that today's continents were once joined into one or two great land masses. These great land masses started to break up 200 million years ago.

Which discovery below would be evidence for the theory of continental drift?

A. A red kangaroo and a koala were found in a South African zoo.
B. The fossil remains of a 250 million year old plant were found in Australia and India.
C. The skeleton of an eighteen year old female Aborigine was found in a South African cemetery.
D. Modern man evolved from *Homo erectus* two million years ago in Africa.

B4. 375

This question refers to this table.

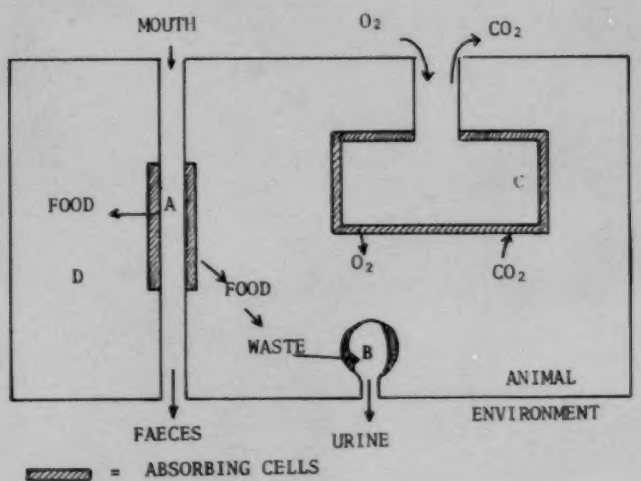
	Carbohydrates	Fat	Protein	Vitamins	Minerals
Milk	✓	✓	✓	✓	✓
Beer	✓	-	-	-	-
Fruit	✓	-	-	✓	✓
Nuts	✓	✓	✓	✓	✓
Sweets	✓	-	-	-	-
Fish	-	✓	✓	✓	✓
Meat	-	✓	✓	✓	✓
Eggs	-	-	✓	✓	✓
Potatoes	✓	-	-	✓	-
Pastry	✓	✓	-	-	-

From this information in the table above which foods *appear* to provide the best nutrition?

A. Fish and meat.
B. Fruit and eggs.
C. Meat and potatoes.
D. Milk and nuts.

D3. 376

This question refers to this diagram.



Study the diagram above. Which section (A, B, C or D) represents the intestine of the animal?

A. A B. B C. C D. D

A2. 377

The next two questions refer to this table which was drawn up after testing five foods with four testing substances each.

FOOD SUBSTANCES	FOOD TESTING SUBSTANCE			
	Millon's Reagent	Fehling's solution	Iodine solution	Sudan III
Egg (protein)	✓	×	×	×
Butter (fat)	×	×	×	✓
Bread (starch)	×	×	✓	×
Glucose (sugar)	×	✓	×	×
Cheese	✓	×	×	✓

KEY: ✓ Reacts when warmed.
× No reaction when warmed.

The food testing substance which would best show the presence of sugar in a food would be

A. Millon's Reagent.
B. Fehling's solution.
C. Iodine solution.
D. Sudan III.

B4. 378

Cheese is a food which has the following food substance/s

A. protein only.
B. fat only.
C. protein and fat only.
D. aged butter fat only.

C4. 379

When sucrose is treated with dilute acid it will give a positive test with

A. Millon's reagent.
B. iodine solution.
C. Fehling's solution.
D. Sudan III dye.

C1. 380

A food substance is boiled in water. When tested with iodine solution it gives a blue colour. The food is most likely to be

A. vegetable. B. meat. C. milk. D. egg.

A2. 381

There are two types of digestion, chemical digestion and mechanical digestion. In the mouth

A. mechanical digestion only occurs.
B. chemical digestion only occurs.
C. both chemical and mechanical digestion occur.
D. no digestion occurs as it begins in the stomach.

C2. 382

A scientist made some bread from flour that contained radioactive elements. She fed the bread to rats in her laboratory.
If she wanted to find out whether the rats assimilate this food, she should look for evidence of radioactivity in their

A. stomachs.
B. small intestines.
C. faeces.
D. tissues.

D3. 383

The next two questions refer to this table.

FOOD	FOOD TYPE
Bread	Starch (carbohydrate)
Butter	Fat
Meat	Protein
Orange	Vitamin C

The digestion of one of the foods, mentioned above, begins in the mouth due to the effect of saliva. The food is

A. bread. B. butter. C. meat. D. orange.

A1. 384

If the liver suddenly stopped producing bile, which of the above foods would be difficult to digest?

A. bread. B. butter. C. meat. D. orange.

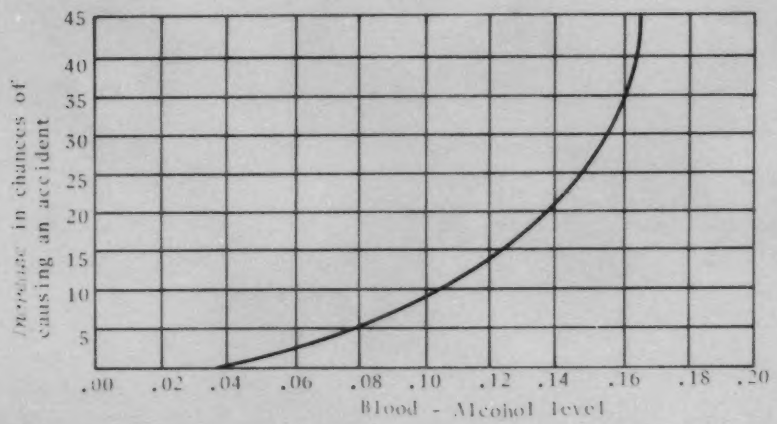
B1. 385

Which of the following advertising slogans for food refers to the way your body uses the food you eat?

A. What you eat today, walks and talks tomorrow.
B. It's polyunsaturated, made from pure vegetable oils.
C. It's full of natural fibres, vitamins and minerals.
D. Made to a recipe, not just a price.

A3. 386

The next question refers to this graph.



This graph shows how the amount of alcohol in a driver's blood affects his chance of having an accident.

What is the blood alcohol level of a driver who is ten times more likely to cause an accident than a driver who has no alcohol in his blood?

A. .09% B. .11% C. .12% D. 11%

B3. 387

Some waste products in the body accumulate in the blood and are removed by the kidneys by a filtration process. Which of the following substances would not normally leave the blood vessel in this way?

A. Blood cells.
B. Salts.
C. Urine.
D. Water.

A2. 388

In man the appendix is very small. In the rabbit it is large and very important to the digestive system. The appendix would probably have an important function in digestion of

A. protein.
B. cellulose.
C. fats.
D. vitamins.

B3. 389

Through scientific research we are able to produce more food. The most likely effect of this would be

A. decrease in animal life.
B. increase in people farming.
C. increase in human population.
D. decrease in family size.

C2. 390

As a result of his study of plant nutrition man now applies fertilizers to his crops.

The reason he does this is to

A. kill harmful bacteria.
B. make the plants grow taller.
C. prevent excessive weed growth.
D. put minerals back into the soil.

D3. 391

Which of the following pairs of processes are the most important contributors to the cycles which keep the percentage of gases in our atmosphere at a constant level?

A. Respiration and decay.
B. Photosynthesis and assimilation.
C. Assimilation and excretion.
D. Photosynthesis and respiration.

D3. 392

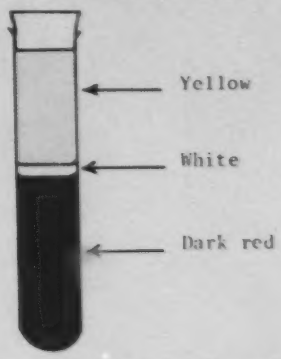
The centre of a heap of rotting lawn clippings or compost heap often feels quite hot because

A. compression from the weight of the material on top causes heating.
B. the sun's rays on hot days causes the water in the dead grass to heat up.
C. the decomposers trap the sun's energy and convert it to food and heat.
D. heat is released in respiration by decomposers.

D2. 393

A sample of blood is shown in a test tube.

This was then placed in a centrifuge for a period of time. After centrifuging it looks like this:



From this observation it follows that blood is

A. a pure substance.
B. a mixture.
C. decomposed by centrifuging.
D. killed by centrifuging.

B4. 394

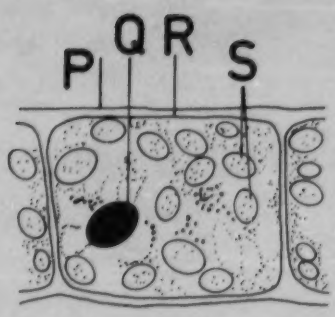
If you have an accident and cut some blood vessels, it is far more serious to cut an artery than to cut a vein. This is because compared with blood in veins, the blood in arteries -

A. contains more food and oxygen
B. is under greater pressure
C. contains more white cells and antibodies
D. is free of wastes and carbon dioxide.

B3. 395

A student observed a cell of an alga under a microscope. He made the following notes.

"It has a rigid cell wall with a cell membrane inside the wall. There is a large round structure called a nucleus in the cell. There are also several small green structures in the cell."



He drew the diagram on the right but forgot to label the cell.

What are the correct names for the labels (P), (Q), (R), and (S) in that order?

A. Nucleus, cell wall, cell membrane, chloroplasts.
B. Cell wall, nucleus, cell membrane, chloroplasts.
C. Cell wall, cell membrane, nucleus, chloroplasts.
D. Chloroplasts, cell membrane, cell wall, nuclei.

B5. 396

Imagine you have just compared a sample of the cells in a mouse and an elephant. You would expect to find that the mouse, compared with the elephant, had

A. fewer cells, but they were larger.
B. fewer cells, about the same size.
C. fewer cells, and they were smaller.
D. the same number of cells, but smaller.

B1. 397

The next question refers to this quotation.

"They are microscopic. They all arose from a fertilised egg. They are found in all humans. They are found throughout the body."

19. "They" are

A. cells.
B. bones.
C. arteries and veins.
D. vitamins.

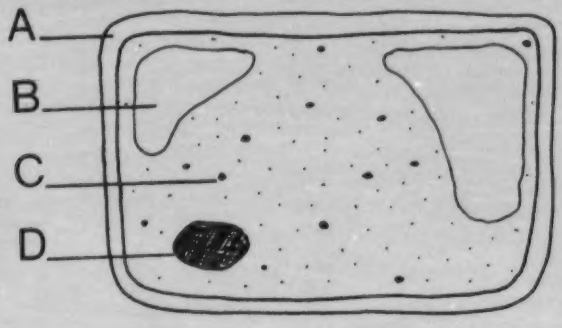
A5. 398

A green-coloured blob of jelly-like material has been found on a beach. To decide if it is a plant, the best thing to do would be to

A. prod it to see if it responds to touch.
B. call it a plant because it is green.
C. use a microscope to look at its cells.
D. cut off a piece and see if it grows.

C5. 399

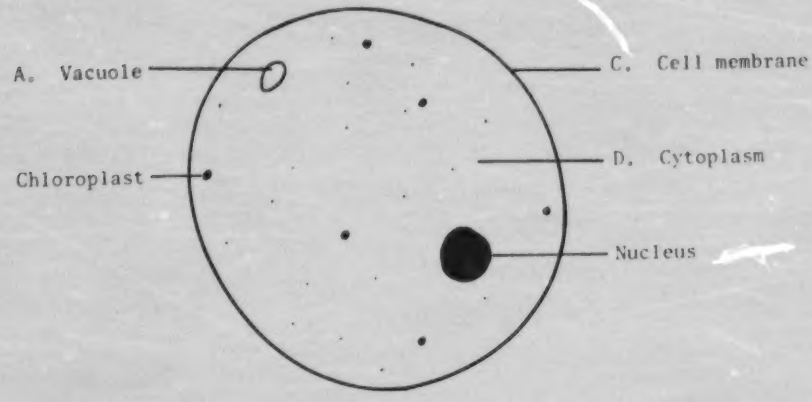
The next question refers to this diagram.



The diagram represents a simple plant cell. Which part of the cell could best be labelled "Vacuole"?

B3. 400

The next question refers to this diagram of an animal cell.



Which label A, B, C or D is INCORRECT?

B2. 401

The next three questions refer to the following information.

Consider the following table and information.

		MALE GAMETES			
		RY	Ry	rY	ry
FEMALE GAMETES	RY	A			
	Ry		B	X	C
	rY				
	ry			D	

R = round seed
r = wrinkled seed
Y = yellow
y = green

Which offspring A, B, C or D would be a wrinkled yellow seed?

D4.

402

Offspring X would be

A. round and yellow.
B. round and green.
C. wrinkled and yellow.
D. wrinkled and green.

A3.

403

The mothers of any offspring *could* be

1. round and yellow.
2. round and green.
3. wrinkled and yellow.
4. wrinkled and green.

Which of the above are possible as mothers of offspring B?

A. 1 and 2 only.
B. 3 and 4 only.
C. 1 and 2 and 3 only.
D. 2 only.

D2.

404

If, for a particular gene pair, parent 1 is homozygous and parent 2 is heterozygous, then the offspring of these parents will be

A. 100% homozygous.
B. 75% homozygous
C. 50% homozygous.
D. 25% homozygous.

C3.

405

When crossing tall and dwarf pea plants, various combinations are possible, especially if colour is considered as well.
Suppose T = tall G = green
t = dwarf g = yellow
And T is dominant over t.
G is dominant over g.
Which of the following offspring will be tall and yellow?

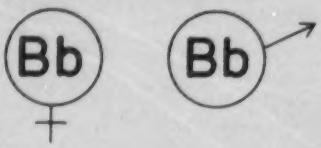
A. tTgg B. TTGG C. TtGg D. ttgG

A2. 406

Consider the sexual combination of the single gene pairs shown.

"B" refers to black colour, "b" refers to white colour.
B is dominant over b.

The parent genes are:-



On average, four offspring would include:
2 x heterozygous black (Bb),
1 x homozygous white (bb), and

A. 1 x homozygous white (bb).
B. 1 x heterozygous white (Bb).
C. 1 x homozygous black (BB).
D. 1 x heterozygous black (Bb).

C4. 407

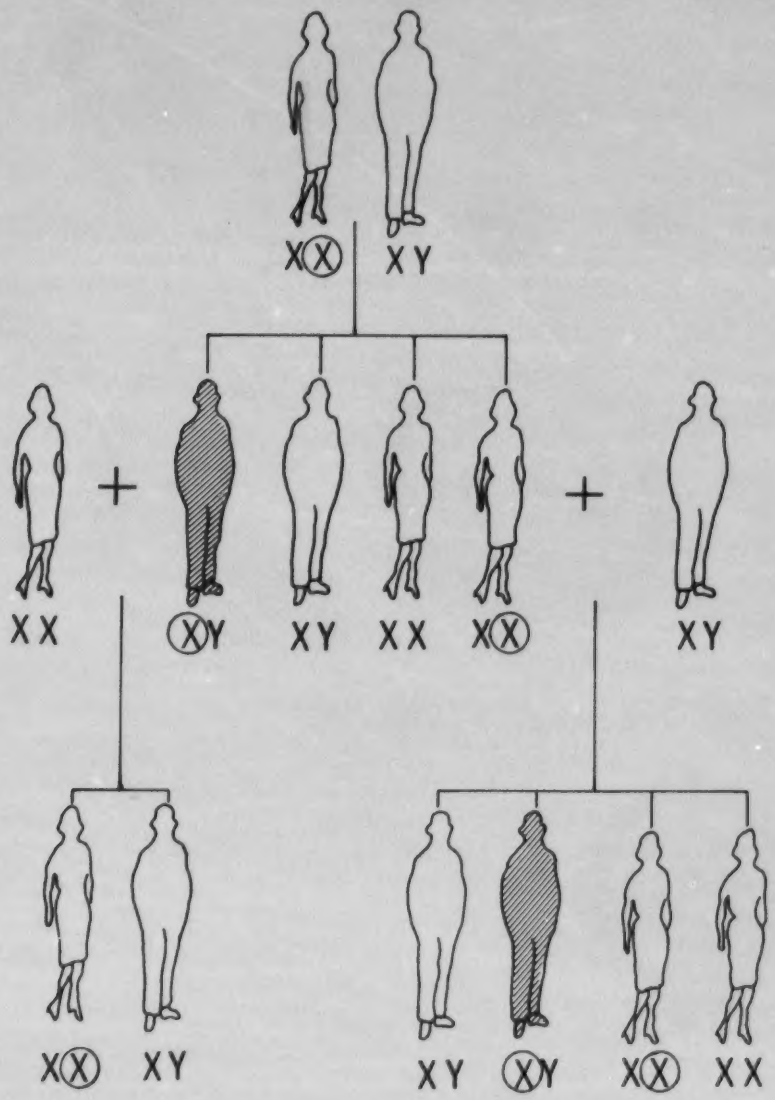
Pollywogs can be either black or white, and it has been shown that in pollywogs black is dominant over white. Pollywogs can be *homozygous* (BB or WW) or *heterozygous* (BW).

A homozygous black male is crossed with a homozygous white female. You would expect the offspring to be

A. all white.
B. all black.
C. some black, some white.
D. some black and white, some grey.

B2. 408

Colour-blindness is an inherited characteristic which is carried on structures called X chromosomes, and is passed on from generation to generation. The shaded figures in the diagram below have the characteristics and *are colour-blind*. The X chromosome in a circle, (X) carries the characteristic. Women with (X) are called "carriers"



From the information in the diagram you can say that

A. both men and women can be subject to colour-blindness.
B. women "carriers" pass on colour-blindness to some of their sons.
C. women "carriers" pass on colour-blindness to all their sons.
D. the daughters of "carrier" women are carriers.

B3.

409

The next question refers to this information.

The San Diablo Valley in California was a rich farming area where the main "crop" was cattle. There were coyotes in the valley which lived mainly on small rodents (rat-like plant-eating animals). The coyotes also killed and ate an occasional calf, so the ranchers laid baits and destroyed the whole coyote population.

Two years later, there was almost no life left in the San Diablo Valley. "It's just like a waste land" said one rancher". "I guess we've learned our lesson the hard way" said another.

The factor relating the coyote poisoning to the damage to the valley would be the

A. destruction of the plant life by drought.
B. clearing of the land for pastures.
C. decreasing number of calves dying.
D. large increase in the number of rodents.

D3. 410

AN ALTERNATIVE FORM APPEARS BELOW

In a valley in lower California, ranchers poisoned off all the coyotes, (animals which usually feed on small rodents) because they took an occasional calf. Since the extermination of the coyotes the valley, once containing rich grasslands, has become denuded of vegetation and is now a waste land. The most likely factor associated with the disappearance of the coyotes and the denudation of the land is

A. destruction of the vegetation by drought.
B. clearing of the land for pastures.
C. decreasing numbers of calves dying.
D. a large increase in the number of rodents.

D3. 411

CAUTION:

THE QUESTIONS ON THIS PAGE

ARE *ALTERNATIVES*.

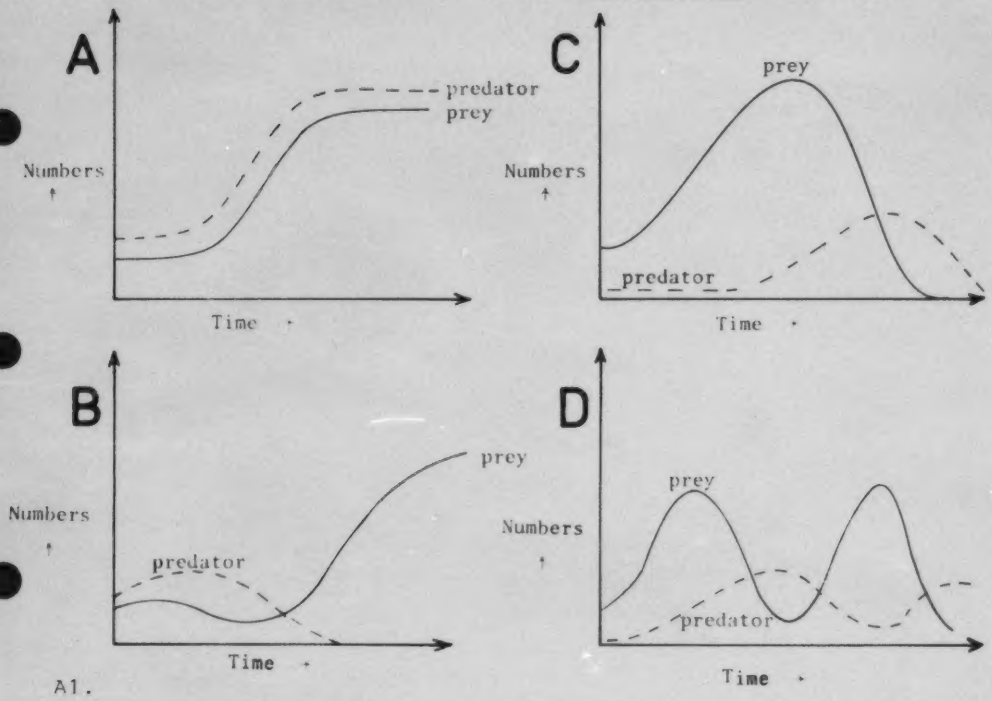
The best definition of a predator would be an animal which

A. is eaten by other animals.
B. eats grass only.
C. eats other animals.
D. eats vegetation only.

C4. 412

A fish tank was set up with large numbers of 2 kinds of microscopic organisms in it. One of these, the predator, fed on the other organism, the prey.
The numbers of each type of organism were counted each day and a graph of the numbers was drawn against time.

Of the following which is the <u>least likely</u> to be the graph drawn?



A1. 413

A change in the size of a population is determined by three variables : the number of births, the number of deaths, and the balance of migration.
Thus, if b = birth rate,
d = death rate,
i = immigration rate,
e = emigration rate, then the overall rate of change (increase or decrease) in a given period is best represented by the formula:

A. (b + i) - (d + e)
B. (b + i) + (d + e)
C. b - d
D. b + d

A3. 414

A number of fish is added to those already in a fish pond. In this pond the water weeds and fish had formed a well balanced community and there was no build-up of any waste materials. The new fish are likely to

1. reduce the available oxygen in the pond.
2. provide more carbon dioxide for the plants.
3. reduce the freedom of movement of the fish.

Which of the above statements are true?

A. 1 and 2 only.
B. 1 and 3 only.
C. 2 and 3 only.
D. 1, 2 and 3.

D2. 415

A number of fish is added to those already in a fish pond, in which the water weeds and fish formed a well balanced community and there was no build up of any excretory material. The addition of the new fish is likely to

A. reduce the available oxygen in the pond only.
B. provide more carbon dioxide for photosynthesis only.
C. reduce the freedom of movement of all the fish only.
D. cause all of the above to happen at the same time.

D4. 416

Most organisms need oxygen for survival. In which of the following environments would an animal be most likely to suffer from lack of oxygen?

A. A stagnant pool.
B. A free flowing stream.
C. An estuary.
D. A coral reef.

A5. 417

If an animal lived for several hours in a confined space, the air in the space would be expected to

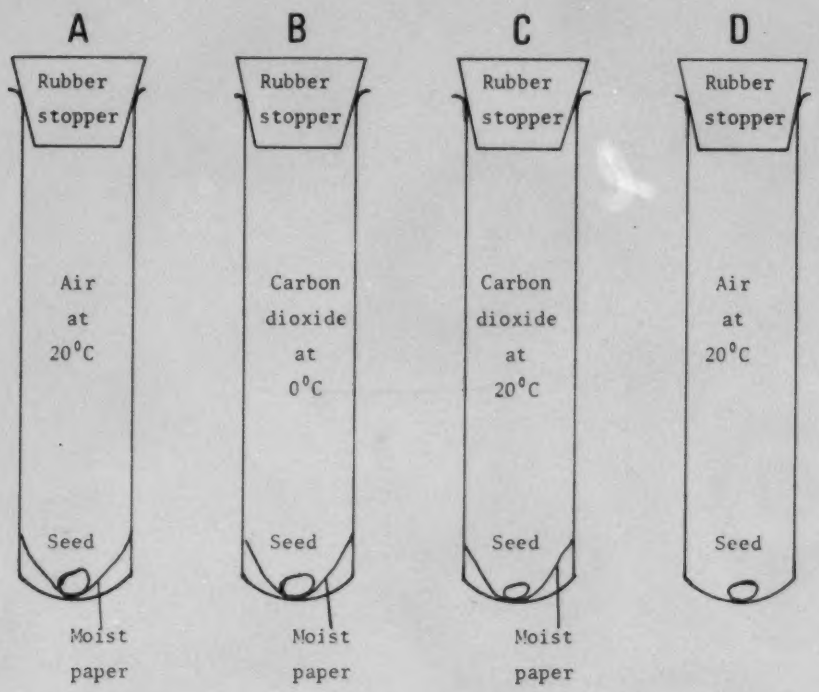
A. increase in oxygen content and decrease in carbon dioxide content.
B. increase in carbon dioxide content and decrease in oxygen and water vapour.
C. increase in carbon dioxide, decrease in oxygen, and show no change in water vapour.
D. increase in carbon dioxide and water vapour and decrease in oxygen content.

D3. 418

A textbook states that the conditions needed for seeds to start growing are

(i) a suitable temperature.
(ii) the presence of water.
(iii) the presence of oxygen.

If the above information is correct, in which of the following sets of apparatus would the seeds start growing?



A4. 419

Two seeds of a green plant were placed in pots. One pot was placed in total darkness and the other left exposed to the light. The plants were given all other requirements. After three weeks each plant was carefully examined.

One difference you would expect the plant grown in the dark to show is

A. much shorter in height.
B. more leaves on the stem.
C. absence of starch in the leaves.
D. more extensive root area.

C1. 420

The next two questions are on the same subject.

When a gardener transplants young seedlings he sometimes removes some of the leaves. He probably does this

A. to reduce water loss.
B. because young leaves do not serve any function.
C. so that the plant uses less food.
D. to induce the roots to grow.

A1. 421

It is possible to remove these leaves because

A. the plant would have some food stored in its stem and roots.
B. soil would soon provide the plant with food.
C. young plants do not require food.
D. roots will carry out photosynthesis until more leaves grow.

A1. 422

When young trees are transplanted some of the root system is always destroyed. One recommended practice is to prune back the branches of the young tree after transplanting. This procedure is recommended because

A. it reduces wind resistance.
B. the tree will not be able to flower.
C. insects are less likely to attack the tree.
D. it reduces transpiration.

D3. 423

OR

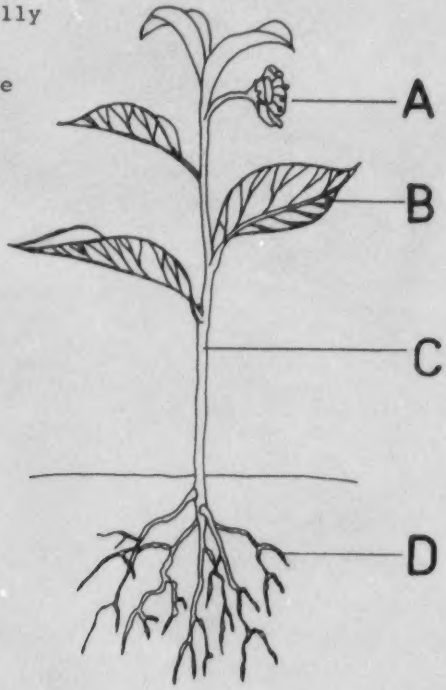
When young trees are transplanted some of the root system is always destroyed. One recommended practice is to prune back the branches of the young tree after transplanting. This procedure is recommended because

A. it reduces wind resistance.
B. the tree will not be able to flower.
C. insects are less likely to attack the tree.
D. it reduces water loss.

D3. 424

The next question refers to the diagram on the right.

To grow and function normally plants require adequate amounts of light and heat, water (H_2O), carbon dioxide (CO_2) and minerals (as a supply of elements like nitrogen (N), phosphorus (P) and potassium (K)). At which of A, B, C and D do these minerals enter the plant?



D4.

425

The table below is taken from a student's notebook and shows four parts of a plant and their functions.

PART	FUNCTION
Flower	Seed production, dispersal of seeds.
Leaf	Exchange of carbon dioxide and oxygen and water. Photosynthesis of sugars.
Roots	Anchorage, absorption of water and minerals, manufacture of glucose from sugars.
Stem	Support, conduction of water, minerals and sugars.

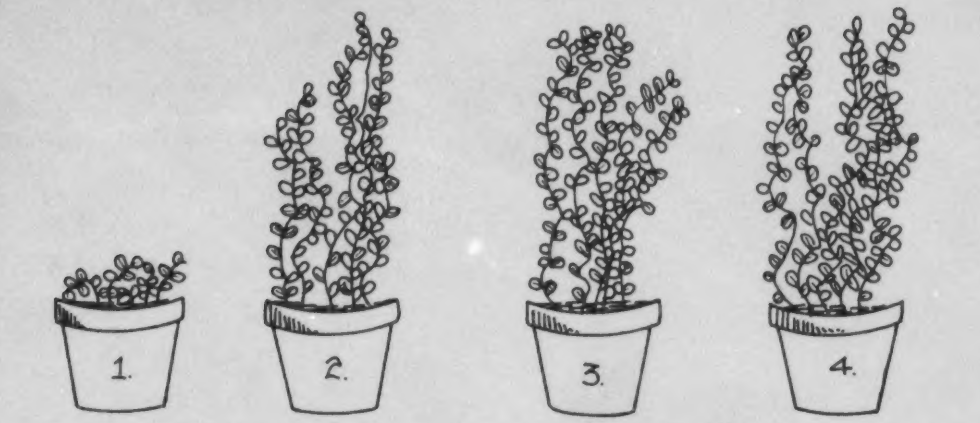
Which part has been given an incorrect function?

A. Flower. B. Leaf. C. Roots. D. Stem.

C1.

426

The next three questions refer to this diagram.



Which container(s) act as controls for this experiment?

A. 1 only.
B. 1 and 3.
C. 3 and 4.
D. 2 and 4.

B3

427

Which containers need to be observed to notice the results of this experiment?

A. 1 and 4.
B. 1, 2 and 4.
C. 2, 3 and 4.
D. 1, 2, 3 and 4.

B3

428

Which conclusion could best be drawn from these results?

A. The additon of chemical "X" causes dwarfism in plants.
B. The addition of chemical "X" causes dwarfism in pea plants.
C. The addition of chemical "X" only affects dwarf pea plants
D. The addition of chemical "X" can affect the height of pea plants.

C3

429

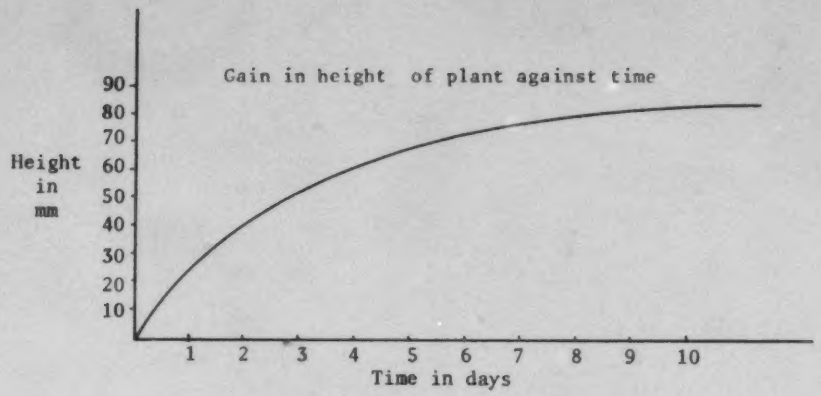
In testing whether the presence of carbon dioxide hastened the conversion of iron to rust, a test tube was set up containing air, iron, water and carbon dioxide.

As a control we should set up a test tube containing iron, water and

A. no air.
B. an inert gas.
C. no carbon dioxide.
D. twice as much carbon dioxide.

C3.

430

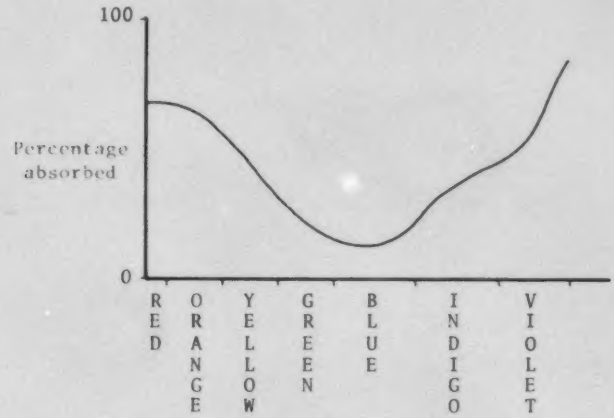


The above graph was drawn by a student after observing the growth of a plant for 10 days. From this we can say that;

A. other plants should grow the same way
B. the growth rate of this plant gradually slowed down
C. the growth rate of this plant gradually increased
D. the plant grew at a constant rate

B5. 431

The graph below shows the percentage of energy absorbed by coloured plastic cards when placed in sunlight.



Imagine a card of each colour placed on a flat surface of snow, in bright sunlight for an hour.
Which card would sink into the snow to the greatest depth?

A. Green card.
B. Violet card.
C. All would sink to the same depth.
D. Data given do not help in answering this question.

B3. 432

Four pairs of students carry out an investigation into the effects of exercise on pulse rate. The procedures they follow are set out in the table below:

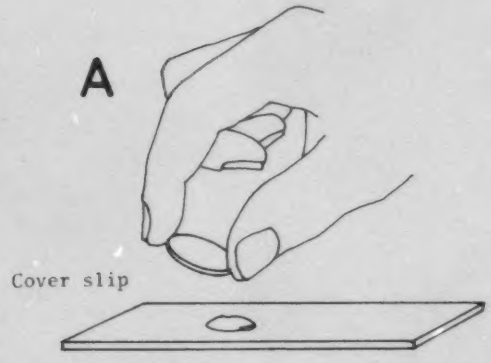
PAIR	NAME	PROCEDURES
A	Joan Mary	Both late for class. Hurry to places. Run on spot for two minutes. Take each other's pulse.
B	John Bill	Runs on spot for two minutes. Takes John's pulse rate after the two minutes.
C	Cathy Helen	Takes Helen's pulse rate, while Helen is still seated. Runs on spot for two minutes. Then has her pulse rate taken by Cathy.
D	Jim Tony	Runs around courtyard for two minutes. Takes own pulse rate. Sits at bench in laboratory and takes own pulse rate.

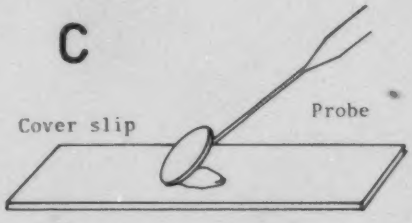
Which pair would obtain the most useful information about pulse rates?

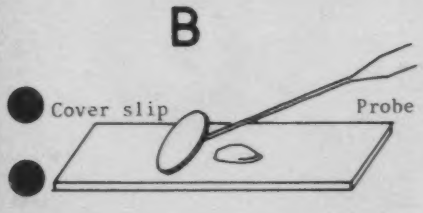
433

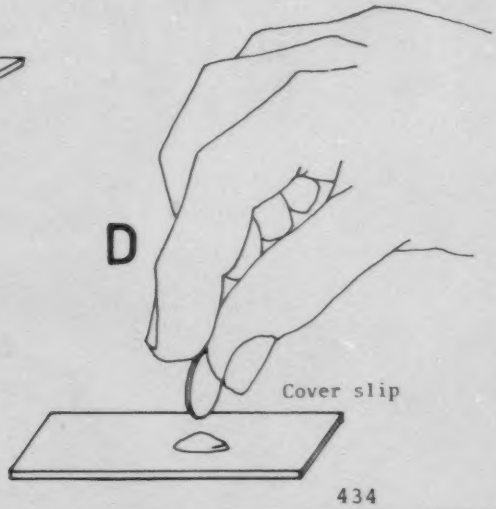
C3.

Which of the following diagrams shows the correct method for putting a cover slip on a microscope slide?







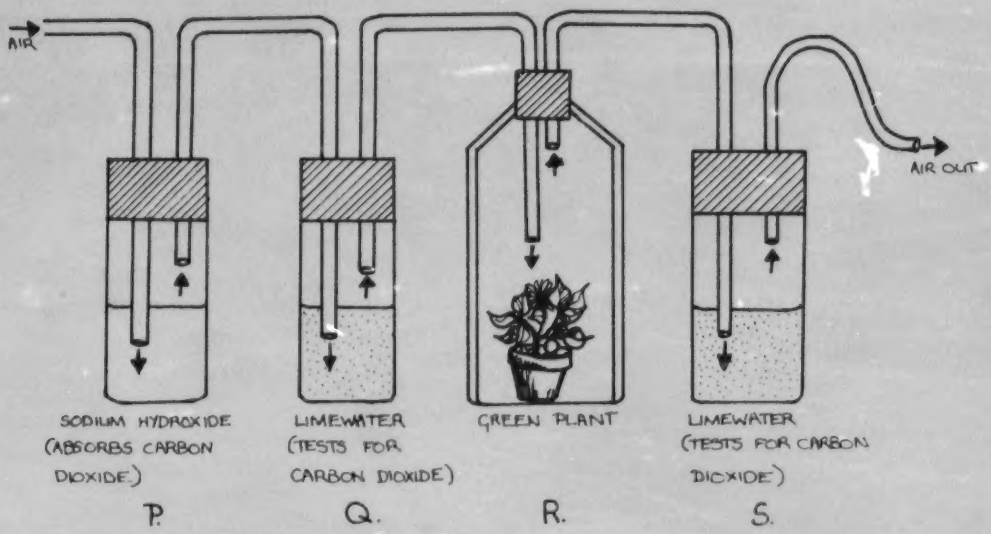


434

C3.

The next question refers to this diagram.

This experiment tests whether green plants make carbon dioxide.



During the experiment it was noticed that the limewater in container Q remained clear, while the limewater in container S turned milky.

Which conclusion is best drawn from these results?

A. Sodium hydroxide absorbs carbon dioxide.
B. Sodium hydroxide does not absorb carbon dioxide completely.
C. The green plant produces more carbon dioxide than the sodium hydroxide can absorb.
D. The green plant produces some carbon dioxide.

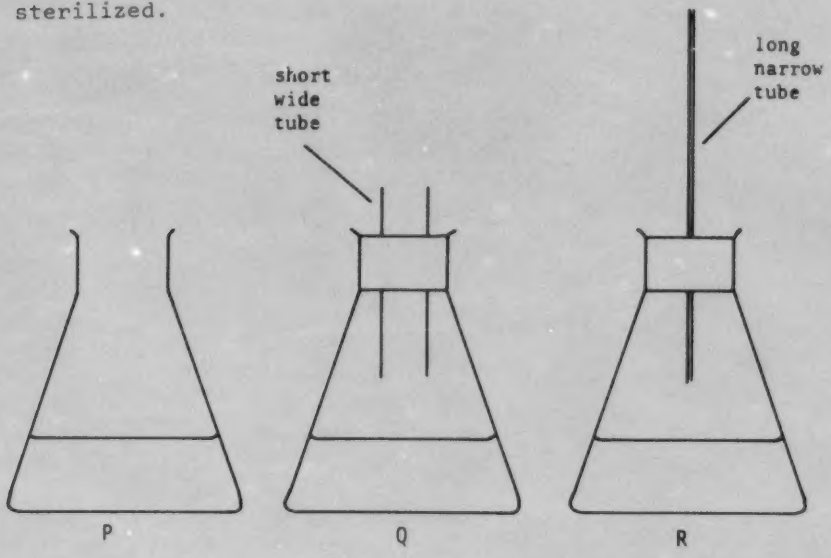
D3. 435

When science students perform experiments, they very often record the data in the form of a table and then plot the data as a graph. The reason why this is done is because

A. graphs are easier to draw from data set out in a table.
B. relationships are better seen graphically than numerically.
C. all laws of nature are best described graphically.
D. a graph proves that a law of nature is correct.

B3. 436

A scientist made up a broth using some cubes of meat extract. He sterilized the broth by heating in a pressure cooker for 20 minutes. He placed some of the broth in each of three flasks as shown below. The flasks and tubing had also been sterilized.



After a few days he noticed that the broth in flasks P and Q had become cloudy and had started to smell, it had 'gone bad'. The most likely reason for this was that

A. spores of bacteria were present in P and Q but not in R when the experiment was set up.
B. air cannot enter R so that the decay bacteria could not grow.
C. bacteria cannot grow in sterilized broth made from meat cubes.
D. spores of bacteria can enter flasks P and Q more easily than R.

D.5 437

To reduce the possibility of errors affecting the results of experiments, scientists try to

A. observe as carefully as possible.
B. repeat the experiment several times.
C. do the experiment under controlled conditions.
D. do all of the above.

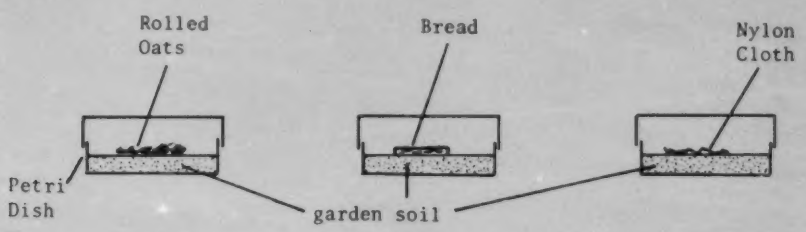
D4. 438

The scientific achievement which distinguishes the 1960's and 1970's from previous periods of time is in the area of

A. antibiotic development.
B. food production.
C. space exploration.
D. radar development.

C4. 439

A scientist placed rolled oats, bread and nylon cloth in three separate petri dishes which contained moist soil taken from a garden (see diagram).



He placed the dishes in an incubator to keep them warm. After 3 days fungi were found growing on the rolled oats and bread. On closer examination the oats and bread were found to contain a large number of bacteria growing on them. The nylon was unaffected by the action of either fungus or bacteria.

From this experiment he could only conclude that

A. nylon does not decompose.
B. nylon takes longer to decompose than bread or rolled oats.
C. certain bacteria and fungi may decompose rolled oats and bread.
D. fungi and bacteria that decompose nylon were not to be found in the soil sample.

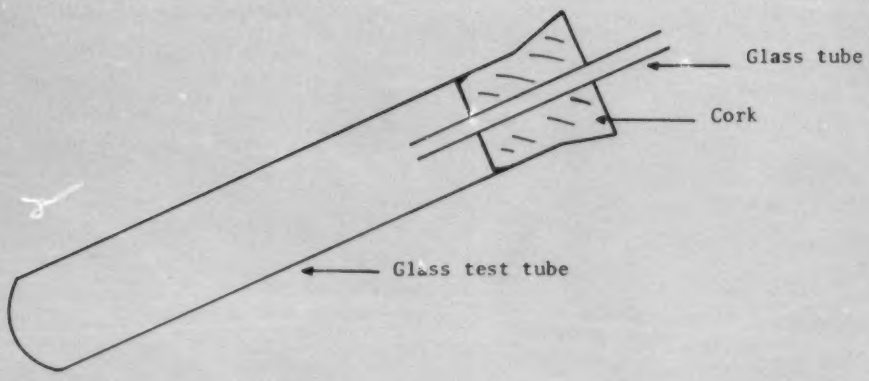
C1. 440

A scientist believes that dogs may not like the cold. To test his idea he should study what happens when he

A. puts a dog in a cold room.
B. lets several dogs choose between hot and cold rooms.
C. puts several dogs in a cold room.
D. lets a dog choose between a hot and cold room.

B3. 441

A student wishes to make up the apparatus in the diagram below.



Before he starts he will need to collect some equipment to do the job. Which of the following groups of equipment will enable him to perform his task?

A. glass tube, cork, test tube, pliers, drill.
B. glass tube, cork, test tube, file, cork borers.
C. glass tube, cork, test tube, bunsen burner, blow pipe.
D. glass tube, cork, pliers, bunsen burner, cork borers.

B3. 442

A person has a particular organ removed in an operation. Following the operation he is advised by his doctor to avoid fats in his diet.

The organ which was removed was most probably

A. his appendix.
B. his gall bladder.
C. his liver.
D. part of his large intestine.

B2. 443

One of the main reasons that we cannot communicate easily with animals is that

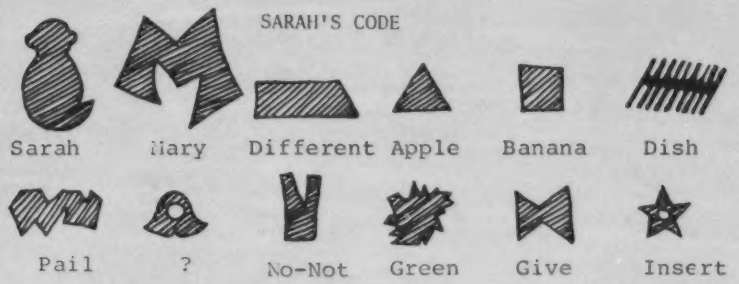
A. animals do not have the right sense organs to receive our signals.
B. animals communicate with each other about things that we don't communicate about.
C. humans cannot make the signals that animals use to communicate.
D. humans do not interpret animals' signals in the same way as animals do.

444

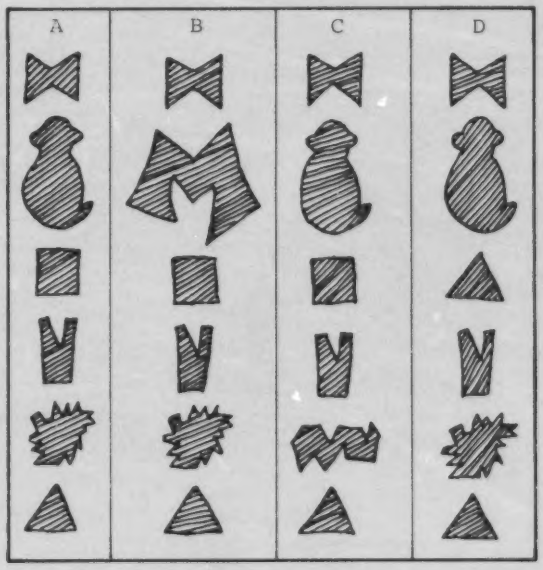
C1.

The next question refers to this information.

SARAH'S CODE



Sarah is a seven year old chimpanzee, who has learned to recognise and use more than 120 different symbols. Some of these, appear above. Which set of symbols below means "Give Sarah a banana, not a green apple."



445

A5.

The next question refers to this advertisement.

Analytical Chemist

We need an Analytical Chemist who has had about five years' postgraduate experience to join the Analytical Section in our Research Department, Botany.

The job is a challenging one as the problems we get are usually in the difficult category, we are also interested in all aspects of environmental control. Apart from a good knowledge of modern instrumental procedures, we would expect that applicants show aptitude in developing new equipment and new procedures and in addition be capable of leading small teams.

The starting salary will be commensurate with experience. Increases in salary depend upon performance and are reviewed regularly.

If you are interested in a job which will keep you on your toes, then write to:

The company considers one quality very important. The company is particularly looking for a scientist who

A. can carry out routine analytical operations.
B. has just graduated from university, and so will be very keen.
C. is able to produce imaginative solutions to problems.
D. knows about modern instruments.

C3. 446

You probably know a song about a man who loved a girl, but he didn't know if she loved him. So he wrote her a letter, and said, "I'll be coming through your town on the bus, and if you love me, tie a yellow ribbon on the old oak tree. And if I don't see a yellow ribbon on the old oak tree, I'll keep right on the bus and I'll never bother you again. But if I see it, I'll get off the bus."

This man's idea for a way of getting the girl to communicate with him, is

A. sensible, because he'll know for sure whether she loves him or not.
B. sensible, because a yellow ribbon would be easy to see on a tree.
C. risky, because many things could prevent her putting the ribbon on the tree.
D. risky, because he'll be embarrassed if there's no ribbon on the tree.

A3. 447

One of the problems we have in using machines such as typewriters or teleprinters for communication, is that the person who types the message may make a mistake. Some messages are much more likely to have this problem than others.

Which of these messages do you think would be most difficult for the operator to type accurately on the machine?

A. BEST WISHES HAPPY BIRTHDAY LOVE ED
B. ARRIVING QANTAS FLIGHT 008 FRI ANN
C. JO 634792 OR 67525504 OR 147982 ROB
D. SYD AUST JUN JUL THEN MELB AUG SEP

C4. 448

A cricket player loses the sight of one eye in an accident, but the other one is not affected. When he plays cricket, he will find that

A. he cannot focus on the ball when it is moving.
B. he can only see the ball half of the time.
C. the ball looks smaller to him.
D. it is hard to judge how far away the ball is.

D3. 449

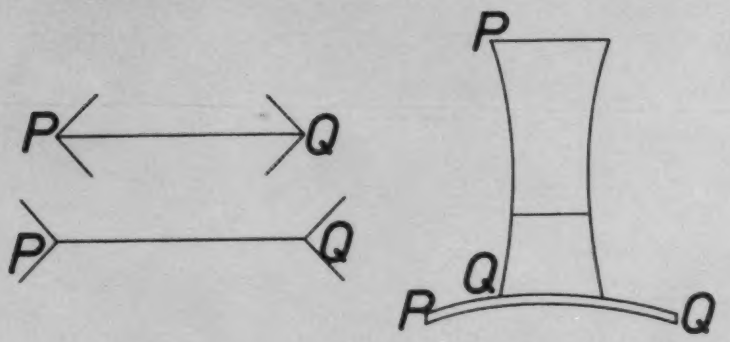
Suppose you were asked to design a calendar to be distributed by an oil company to all its English-speaking customers all around the world. The calendar must be attractive, and it must contain some extra, useful information so that the customers will keep it and use it. You must choose information that will be true for every part of the world.

If you had to choose from the following list, it would be best to give information about the times of

A. high and low tides.
B. seasons and weather.
C. phases of the moon.
D. sunrise and sunset.

C2. 450

The next question refers to the diagrams



The lines marked PQ in all of the above diagrams are the same length in spite of the fact that you do not see them to be so. These and other optical illusions are deceiving because -

A. the same length line in different positions appears as different lengths on the retina of the eye.

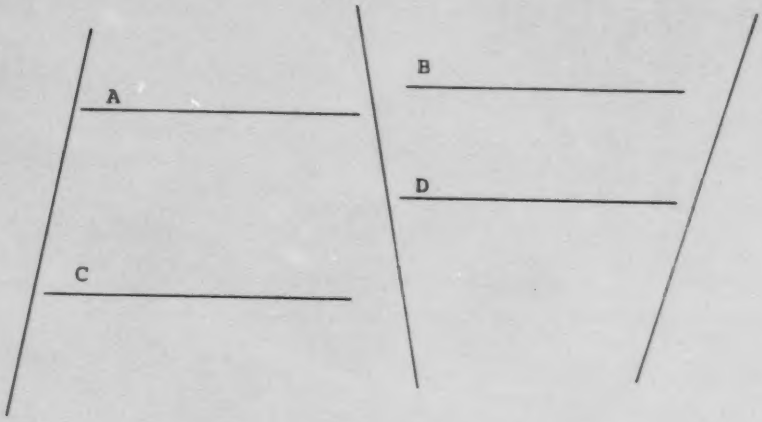
B. the presence of extra lines in the diagrams upsets the brain's interpretation of the image on the retina.

C. the apparent difference is due to poor judgement and they would appear the same if one practiced more.

D. they are just party tricks and have no scientific importance at all.

B3. 451

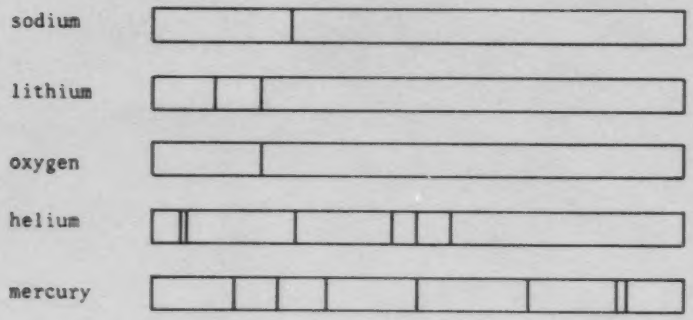
Which line below (A, B, C or D) is the longest?



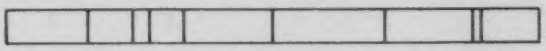
C5. 452

Scientists can find out what elements are present in stars by looking at the spectra of stars. Spectra are a series of lines which appear on a photographic film.

Spectra of some elements are given below:



A star gives this spectrum:



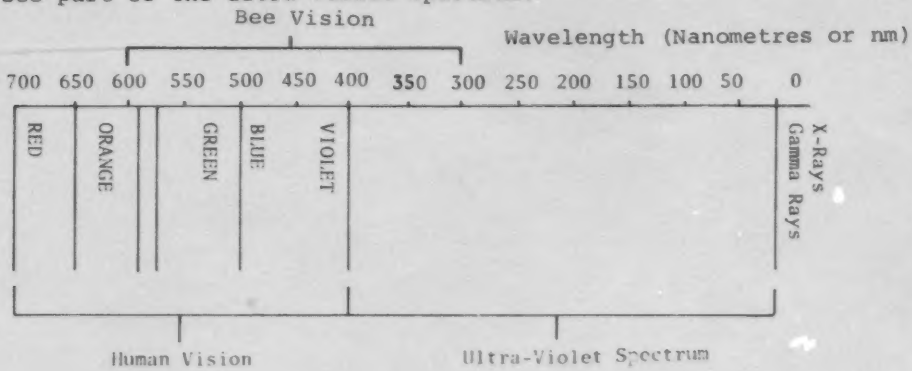
The elements present in the star are:

A. sodium and mercury.
B. lithium and mercury.
C. oxygen and mercury.
D. helium and mercury.

A3.

453

Ultra-violet radiation is invisible to human eyes, although bees see part of the ultra-violet spectrum.



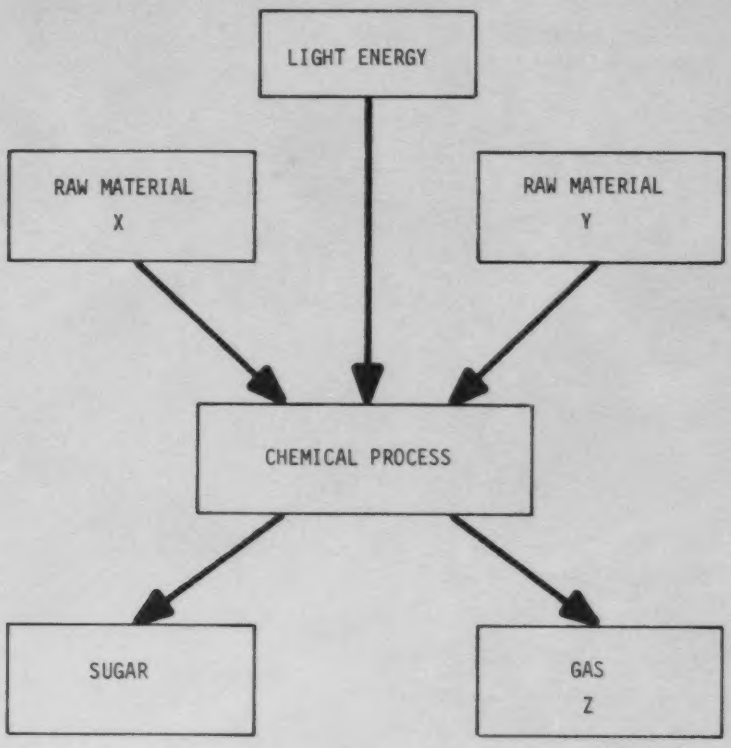
What wavelengths of light can both humans and bees detect?

A. 400 nm - 300 nm.
B. 600 nm - 300 nm.
C. 600 nm - 400 nm.
D. 700 nm - 300 nm.

C3.

454

The diagram below shows how plants make their own food.



Which of these statements about the diagram is correct?

A. *X* is carbon dioxide, *Y* is water and *Z* is oxygen.
B. *X* is water, *Y* is oxygen and *Z* is carbon dioxide.
C. *X* is oxygen, *Y* is carbon dioxide and *Z* is water.
D. *X* is oxygen, *Y* is water and *Z* is carbon dioxide.

455

A3.

A glowing match was dropped into a dry gas jar containing one gas only. The match (but not the gas) caught alight. The gas in the jar must have been

A. carbon dioxide.
B. carbon monoxide.
C. hydrogen.
D. oxygen.

456

D3.

The following table lists some of the properties of two chemicals *X* and *Y*.

CHEMICAL *X*	CHEMICAL *Y*
white powder does not dissolve in water melts at 410°C reacts with acids does not react with *Y*	white powder dissolves in water melts at 960°C does not react with acids does not react with *X*

Equal amounts of *X* and *Y* were mixed and placed in a beaker. Acid was then poured onto the mixture. *Using the information above* you could definitely say that

A. *X* will react and *Y* will melt.
B. *X* will not react and *Y* will dissolve.
C. *X* will not react and *Y* will not dissolve.
D. *X* will react and *Y* will not melt.

D3. 457

Many chemical reactions occurring in excess water solutions will proceed more slowly if further water is added.
The factor causing this would be

A. a change in temperature.
B. a change in the concentration of the reactants.
C. the nature of the substances.
D. a change in the surface area exposed.

B3. 458

The chemical cobalt nitrate is painted on some weather indicators used in household barometers.

When the weather is fine the chemical is blue, when the rain is likely, the chemical turns pink.

This change of colour is most likely to be caused by

A. the temperature of the air.
B. air pressure near the barometer.
C. humidity of the air.
D. ionisation caused by lightning.

C4. 459

Two theories as to why solids dissolve in a liquid, have been suggested by scientists.

They are:

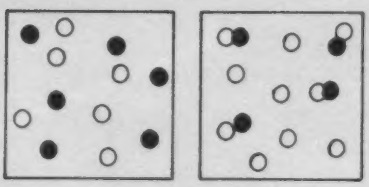
Theory 1: The solid particles fit between the water particles.

Theory 2: The solid particles join onto the water particles.

Which pair of diagrams below correctly fits *both* of these theories?

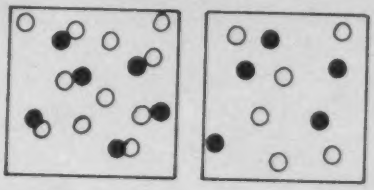
○ *Water particle* ● *Solid particle*

A



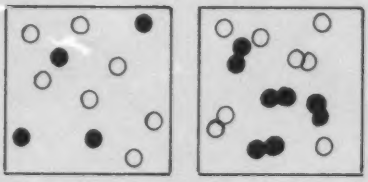
Theory 1 Theory 2

C



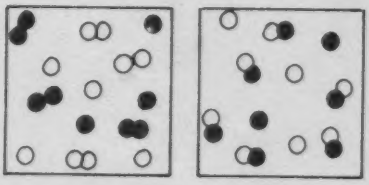
Theory 1 Theory 2

B



Theory 1 Theory 2

D



Theory 1 Theory 2

A3.

460

A student tested six compounds containing the element sodium and found that they all dissolved readily in water. He should conclude that

A. common sodium compounds dissolve in water.
B. sodium compounds dissolve in water.
C. some sodium compounds dissolve in water.
D. water is able to dissolve most compounds.

C2.

461

The following table shows the *colour* of litmus in various solutions:

TYPE OF LITMUS	SOLUTION		
	ACID	ALKALI	NEUTRAL
RED	*Red*	*Blue*	*Red*
BLUE	*Red*	*Blue*	*Blue*

A student places a piece of blue litmus paper in a colourless liquid and finds that the paper maintains its blue colour. He concludes, from this evidence alone that the solution is alkaline.

Which of the following statements is correct?

A. The student has made an accurate deduction and needs no additional evidence.
B. He should test the solution with a piece of red litmus before drawing conclusions.
C. He should repeat the experiment with another piece of blue litmus paper before drawing conclusions.
D. His conclusion is correct since only acids would change the colour of the blue litmus.

B3. 462

Most acids when poured onto carbonate compounds produce bubbles of carbon dioxide gas

When hydrochloric acid is poured onto a rock, bubbles of gas are seen. From this observation you can conclude that the rock

A. contains calcium carbonate.
B. has pockets of gas in it.
C. is an alkali.
D. turns litmus red.

A3. 463

Acids are regarded as compounds because they

A. contain at least two elements.
B. contain hydrogen.
C. dissolve in water.
D. turns blue litmus paper red.

A3. 464

Sugar contains three elements - carbon, hydrogen and oxygen. In sugars, the number of hydrogen atoms is always twice the number of oxygen atoms.
If table sugar, sucrose, contains 12 carbon atoms and 22 hydrogen atoms, how many oxygen atoms does it have?

A. 10 B. 11 C. 22 D. 34

B4. 465

The formula of a compound indicates the number of atoms of each type in a molecule of that compound. The formula for glucose is $C_6H_{12}O_6$. From this formula you can determine that

A. a molecule of glucose is made up of 24 atoms.
B. six atoms of carbon will always combine with twelve atoms of Hydrogen.
C. glucose is made from carbon dioxide and water in green plants.
D. glucose often occurs in lollies.

A3. 466

The next two questions refer to this information.

A student added two drops of universal indicator to each of four beakers containing colourless solutions.
The results are shown below.

SOLUTION	TURNS
1	Green
2	Blue
3	Red
4	Yellow

Which solution(s) could be acidic?

A. 1 and 2. C. 3 only.
B. 3 and 4. D. 1, 2 and 4.

B2. 467

Which solution would be the most acidic?

A. 1 B. 2 C. 3 D. 4

C3. 468

The next 3 questions refer to this information

Four solutions were tested with different indicators as shown below:-

Solution	Indicator used to test solution	Observation
P	Methyl Orange	Solution turns yellow
Q	Red Litmus	Litmus stays red
R	Blue Litmus	Litmus stays blue
S	Universal Indicator	Solution turns green

Which solution COULD be water?

A. P only
B. Q or R only
C. Q or R or S
D. S only

C1. 469

Which solution has reacted with the indicator used in such a way that it, rather than any of the other solutions, is most likely to be water?

A. P C. R
B. Q D. S

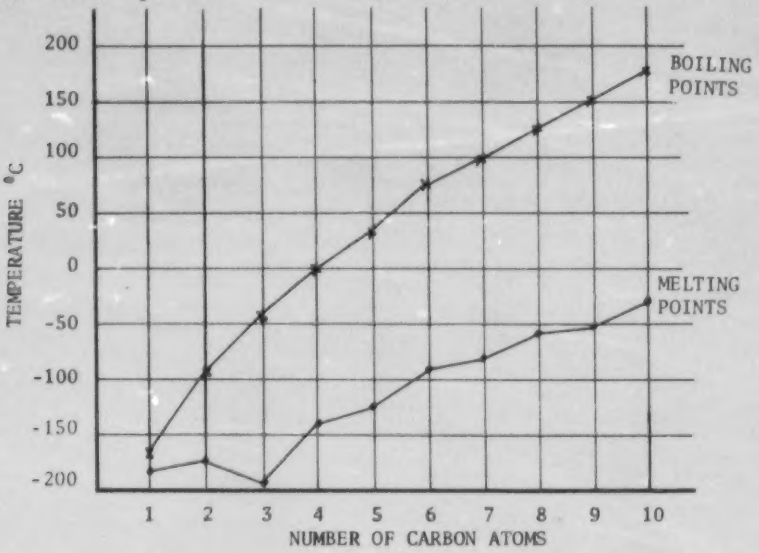
D2. 470

Why are we unable to say definitely, which solution, if any, is water?

A. Two indicators, say red & blue litmus, need to be used to find out which is water.
B. A neutral reaction with an indicator is caused by many solutions not only water.
C. None of the tests used has been controlled - a container of water should have been tested also.
D. Indicators will only react with solutions which are either acidic or alkaline.

B2. 471

The next two questions refer to this graph.
The graph shows the melting and boiling point of ten compounds, plotted against the number of carbon atoms in the compound.



Which statement concerning the compounds is correct?

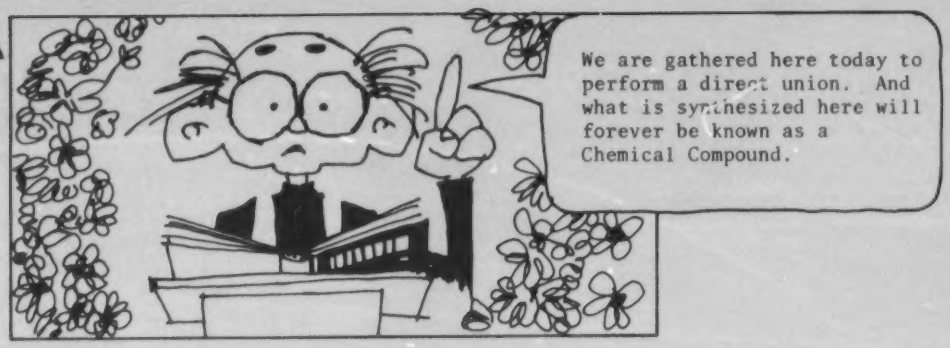
A. All are liquids at room temperature.
B. Only compounds, 5, 6, 7, 8, 9 and 10 are liquids at room temperature.
C. All except compounds 1, 2 and 3 are gases at room temperature.
D. Only compound 10 is a solid at room temperature.

B2. 472

If the trend continued as shown in the graphs, then a compound with 12 carbon atoms would have M.P. and B.P. as given by

	M.P. (°C)	B.P. (°C)
A	250	-75
B	200	0
C	0	250
D	-75	200

C3. 473


A
We are gathered here today to perform a direct union. And what is synthesized here will forever be known as a Chemical Compound.

Which cartoon character is making an explanation?

D
I wonder if the liquid detergent will break the surface tension. Hmmm, will a few drops of water do the same thing?
LIQUID
Detergent

84.

The next question refers to this diagram.

1. The highest energy level in an atom may be called the valence energy level.
2. Electrons found in the valence energy level are called valence electrons
3. Do you really expect me to understand that!? *Now I know you are nuts!* First you tell me the world is round, now you tell me electrons found in the valence energy level are called valence electrons! You are truly unbelievable.
4. *Send in the Jester, he's better than you.*

Which portion(s) of the above cartoon conversation could be called a definition?

A. 2 only. B. 4 only. C. 1 and 2. D. 2 and 4.

A3.

475

Of the following statements, which one can best be regarded as a scientific hypothesis which could be tested by experiment within the next 10 or 20 years?

A. Many forms of cancer are produced by viruses.

B. An apple a day keeps the doctor away.

C. If you walk under a ladder it will bring bad luck.

D. The early Aborigines could communicate with each other by thought transference.

A5.

476

The next three questions refer to this table which shows the numbers of protons, neutrons and electrons in four different atoms.

ATOM	PROTONS	NEUTRONS	ELECTRONS
J	7	8	7
K	7	9	7
L	8	8	8
M	9	9	9

The two atoms which would be isotopes are

A. J and K. B. J and L. C. K and L. D. K and M.

A3.

477

The two atoms with the same mass would be

A. J and K. B. J and L. C. K and L. D. K and M.

C1.

478

In each of the four atoms, the number of protons is the same as the number of electrons. This happens because protons and electrons have

A. opposite charges.
B. the same charge.
C. different mass.
D. the same mass.

A2.

479

This question refers to the list of elements shown below.

ELEMENT	SYMBOL	NUMBER OF NEUTRONS	NUMBER OF PROTONS	ATOMIC WEIGHT	ARRANGEMENT OF ELECTRONS IN ORBITS
LITHIUM	Li	1	3	4	2 : 1
SODIUM	Na	10	11	23	2 : 8 : 1
POTASSIUM	K	20	19	39	2 : 8 : 8 : 1

These elements show almost identical chemical behaviour. Given the fact that the chemical behaviour of an element depends on one of the factors in the table above, which is the most likely?

A. Number of neutrons in the atom.
B. Number of protons in the atom.
C. Atomic weight for each element.
D. Arrangement of electrons in orbits.

D3. 480

The earliest idea about atoms was that they are hard, indivisible balls. As time went on, scientists developed other ideas about what atoms are like. Here are three of them:

1. Atoms have a hard positive nucleus with electrons orbiting around it.
2. Atoms have a nucleus made up of protons and neutrons with electrons orbiting around it.
3. The atom consists of a mixture of protons and electrons.

The most likely order in which these were put forward would be

A. 1, 2, 3.
B. 2, 3, 1.
C. 3, 1, 2.
D. 3, 2, 1.

C3. 481

An alka-seltzer tablet weighing 2 grams is added to a flask. Water is added and the flask is immediately sealed and weighed. Its weight was 200 grams. Bubbles form and the tablet disappears. The flask will now weigh

A. 200 grams.
B. slightly more than 200 grams.
C. slightly less than 200 grams.
D. 202 grams.

A3. 482

The next three questions refer to the following information.

The table gives the symbol, atomic number and mass number for several elements.

I	II	III	IV
Element	Symbol	Atomic Number (Z)	Mass Number of most Common Isotope (A)
Hydrogen	H	1	1
Helium	He	2	4
Lithium	Li	3	7
Beryllium	Be	4	9
Boron	B	5	11
Carbon	C	6	12

The element which has a mass number of 11 for its most common isotope is

A. Boron. B. Carbon. C. Helium. D. Lithium.

A5. 483

The element containing 4 protons in the nucleus of its most common isotope is

A. Beryllium. B. Boron. C. Helium. D. Lithium.

A2. 484

Which element has 4 neutrons in the nucleus of its most common isotope?

A. Beryllium. B. Boron. C. Helium. D. Lithium.

D3. 485

Read the following passage:

Several thousand years ago the Greeks argued about why matter behaves like it does. Aristotle had one way of explaining its behaviour and Democritus had another. Democritus said that *matter was made up of tiny, unbreakable particles*. Aristotle said that matter was not like this and that when a piece of matter was divided into smaller pieces, it could always be divided again.

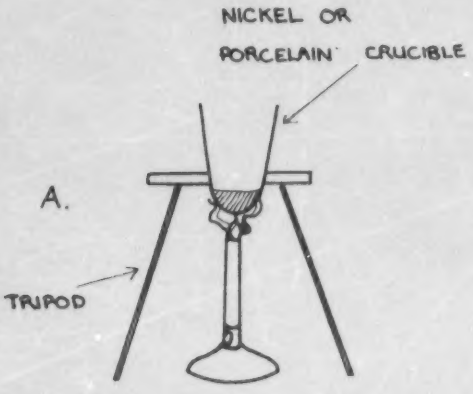
The part of the statement above which has been underlined is best described as

A. an observation.
B. a fact.
C. an hypothesis.
D. a result.

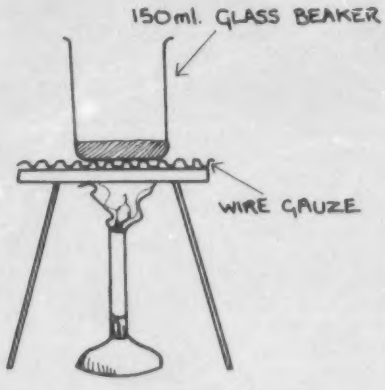
C2. 486

Which of the following pieces of apparatus would be the most suitable for melting 10 grams of sodium chloride in the laboratory?

A.

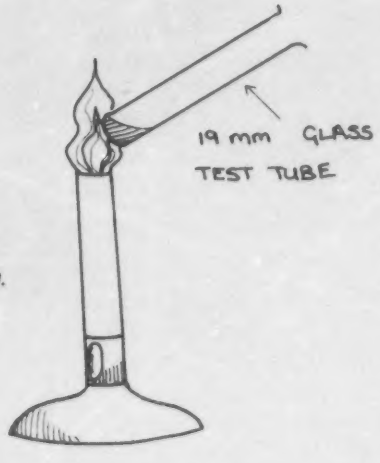


B.



C.

D.



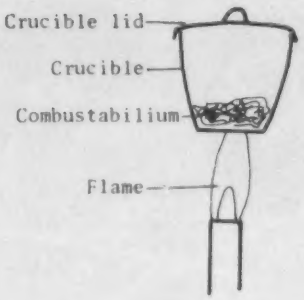
A1. 487

A piece of magnesium was heated in argon gas. The mass of magnesium used was 1.50 g, the mass of argon used was 3.00 g. After heating the magnesium was withdrawn and weighed. The mass of the argon left would have been

A. 1.50 g B. 2.25 g C. 3.00 g D. 4.50 g

C1. 488

An experiment performed in a school laboratory involved burning the metal COMBUSTABILIUM in a crucible as shown in the diagram.



The aim of the experiment was to find how much of the combustabilium combined with oxygen gas from the air during the time that the metal in the crucible was heated.

The following results were obtained:

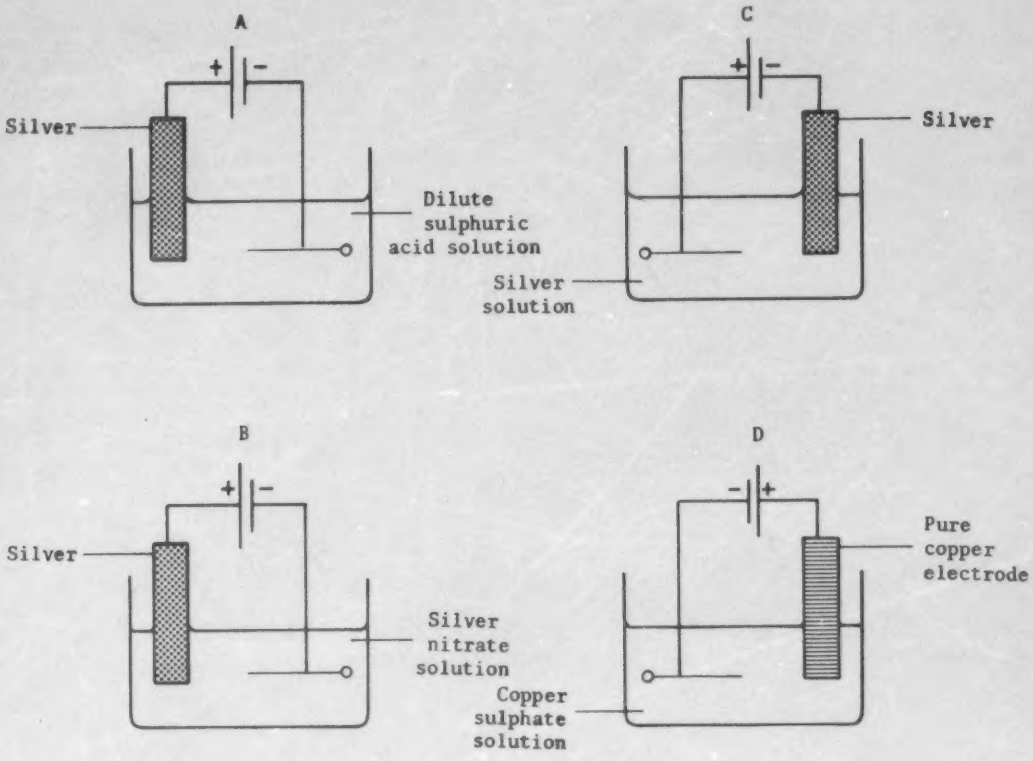
	Item	Mass (g)
Before Burning	Crucible Lid	7.91
	Crucible	30.73
	Combustabilium	24.32
After Burning	Crucible Lid + Product After Burning	79.96

Assuming that the only mass change was due to combustabilium combining with oxygen, the pupils should calculate that the amount of oxygen in the product after burning is closest to

A. 14 g. C. 16 g.

D2. B. 15 g. D. 17 g. 489

The next question refers to these diagrams.



Which circuit above best resembles the circuit used in industry to make silver plated cutlery sets?

B2. 490

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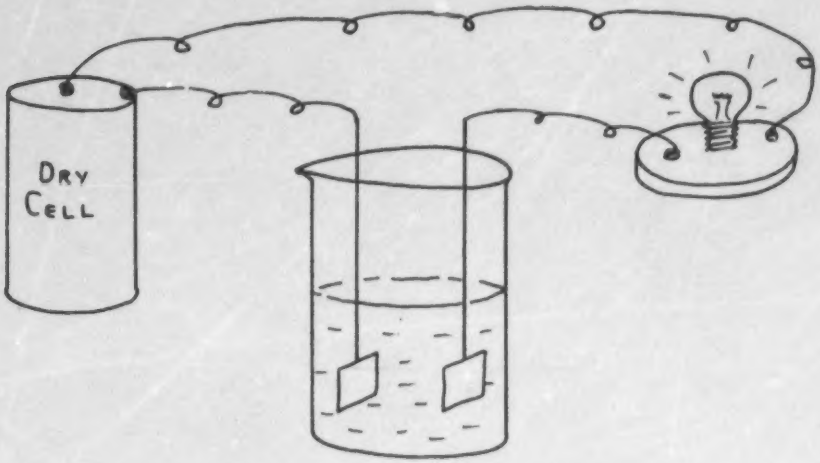
10 grams of a substance P is added to 50 grams of a liquid Q. A reaction takes place and after the reaction, the resulting solution R is weighed and found to weigh 57 grams. This reduction of 3 grams is due to

A. 3 grams of P being dissolved by liquid Q.
B. the molecules of R being smaller than those of P or Q.
C. 3 grams of a gas being lost during the reaction.
D. the molecules of P fitting between those of liquid Q.

C3. 491

The next three questions refer to this diagram.



The diagram above shows a dry cell connected to a lamp through two metal plates immersed in water containing a dissolved substance.

The shining lamp means that the solution must contain

A. atoms. B. ions. C. molecules. D. neutrons.

B2. 492

The shining lamp means that the substance is

A. a carbohydrate.
B. an electrolyte.
C. a non-electolyte.
D. an insoluble substance.

B5. 493

The shining lamp means that the substance <u>cannot</u> be

A. an acid. B. an alkali. C. a salt. D. a sugar.

D3. 494

Limewater turns milky when carbon dioxide is produced. If different substances are burned in a gas jar and then tested with limewater, the substance which would NOT cause limewater to go milky is

A. candle. B. wood. C. butter. D. sulphur.

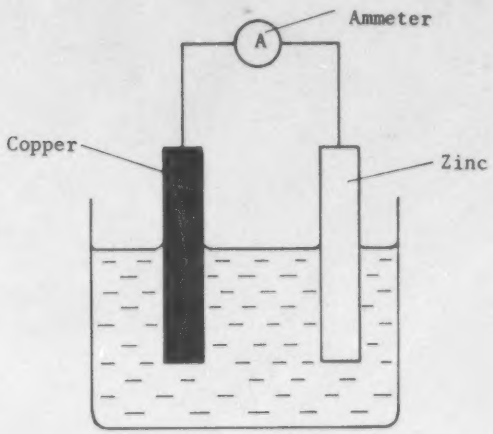
D2. 495

Some chemicals change colour depending on the amount of moisture around them.
This is used in

A. weather indicators.
B. colouring for jellys.
C. neutralisation reactions.
D. fluorescent paints.

A2. 496

The next question refers to this diagram



Which solution would cause the largest current to flow in the circuit drawn above?

A. sugar disolved in water
B. methylated spirits
C. vinegar.
D. olive oil.

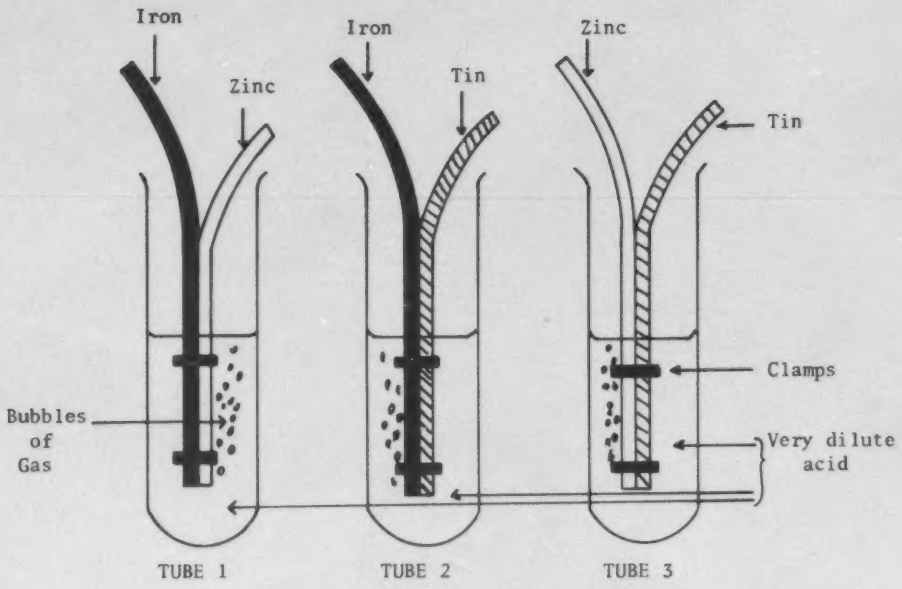
C1. 497

Organic compounds must contain the element

A. hydrogen. B. oxygen. C. carbon. D. nitrogen.

C1. 498

This question refers to this experiment.



Observations Made:

Tube 1 : Zinc reacted with acid
Tube 2 : Iron reacted with acid
Tube 3 : Zinc reacted with acid

On the basis of this experiment what is the order of activity of the metals from most to least active?

A. Iron, Zinc, Tin.
B. Zinc, Iron, Tin.
C. Tin, Iron, Zinc.
D. Iron, Tin, Zinc.

B3. 499

A gardener has discovered that the soil in his garden is acidic (pH of 3.5) and he wishes to grow vegetables which tolerate only neutral conditions (pH of about 7). To enable the vegetables to grow successfully he would be wise to

A. add an acidic fertiliser to the soil.
B. add a strong base such as caustic soda to the soil.
C. burn the acid out of the soil.
D. add a neutralising agent such as limestone to the soil.

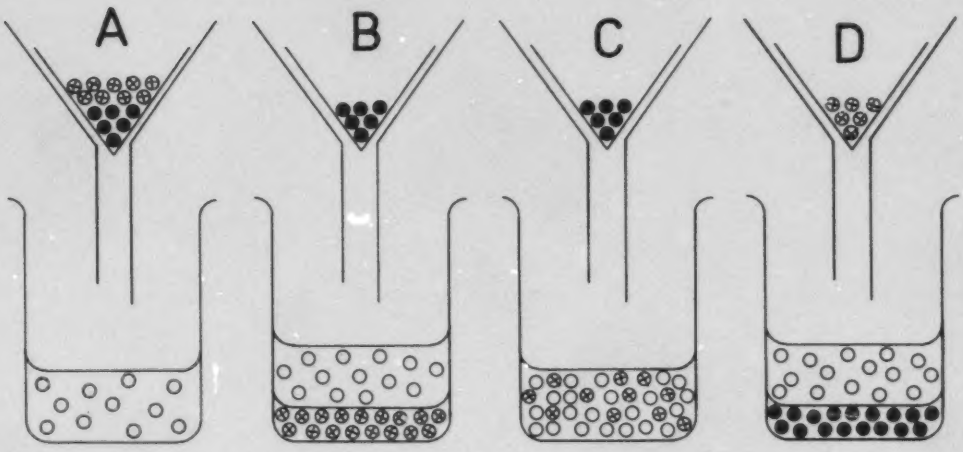
D3. 500

A student mixed together in the same container, quantities of salt, sand, and water, and then filtered the resulting mixture. Which diagram below best represents the filtered mixture of

○ = water particle

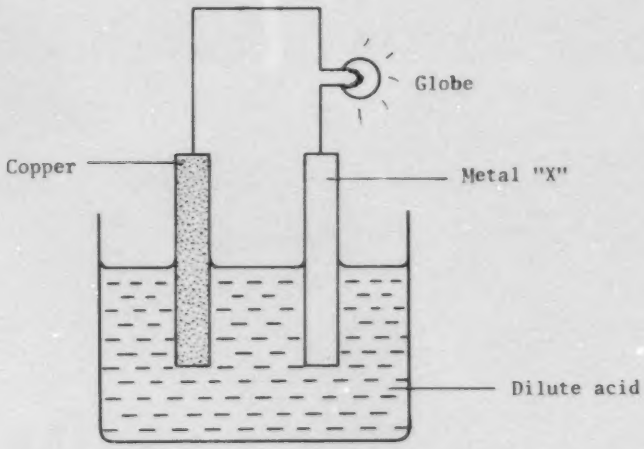
⊗ = salt particle

● = sand particle



C3. 501

The next question refers to this diagram.



Which metal (below) when placed in the circuit instead of metal "X", would cause the globe to glow most brightly?

A. Tin.
B. Silver.
C. Zinc.
D. Lead.

C2. 502

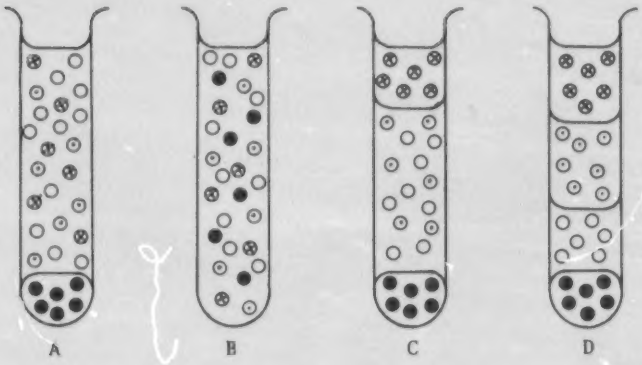
A small quantity of water, mercury, kerosene and methylated spirits were mixed in a test tube. Which diagram below best represents the appearance of the test tube and its contents if

○= water particles

●= mercury particles

⊗= kerosene particles

⊙= methylated spirits particles



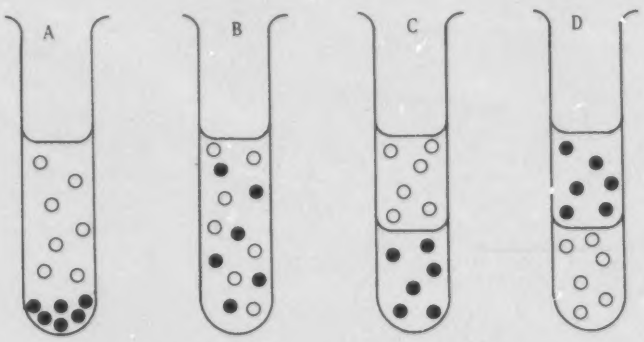
C2. 503

A small amount of water and methylated spirits were mixed together and the resulting mixture drawn by a student who represented particles of:

water as ○

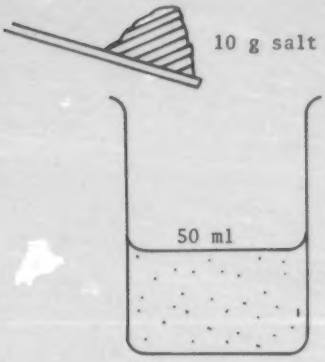
methylated spirits as ●

Which test tube drawn below gives a correct representation of the mixture?



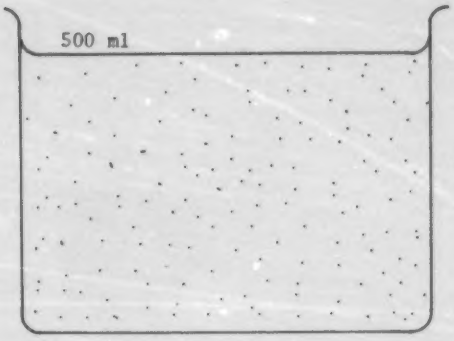
B1. 504

A student dissolved 10 grams of salt in 50 ml of water.

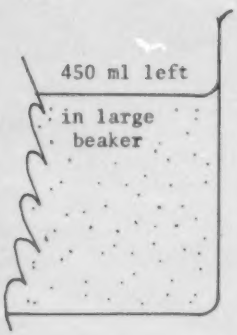


+ 450 ml water

He then put the solution in a larger beaker and added 450 ml of water to a total of 500 ml.



From the large beaker he then poured off 50 ml into a small cylinder.



How much salt would be dissolved in the 50 ml of solution in the cylinder X?

A. 0 g.
B. 1 g.
C. 9.5 g.
D. 10 g.

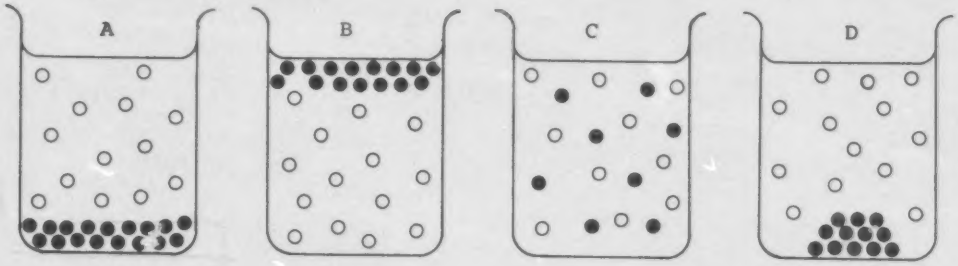
B3.

505

Which of the beakers drawn below might contain a suspension?

○ Liquid particles

● Solid particles



C1.

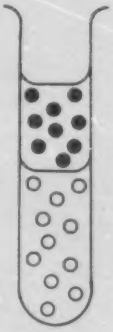
506

A student added a small quantity of oil to a test-tube containing water and then placed the test-tube in a centrifuge for several minutes. If water and oil particles are represented as

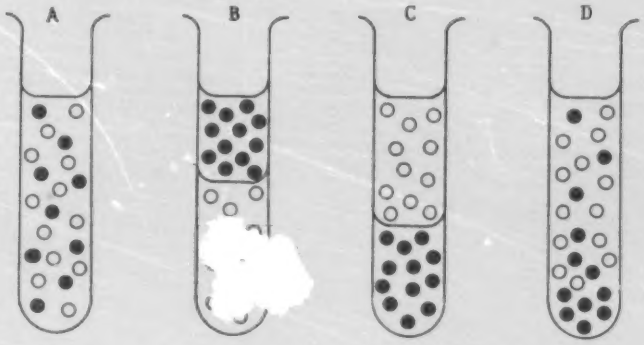
○ = water

● = oil,

before centrifuging



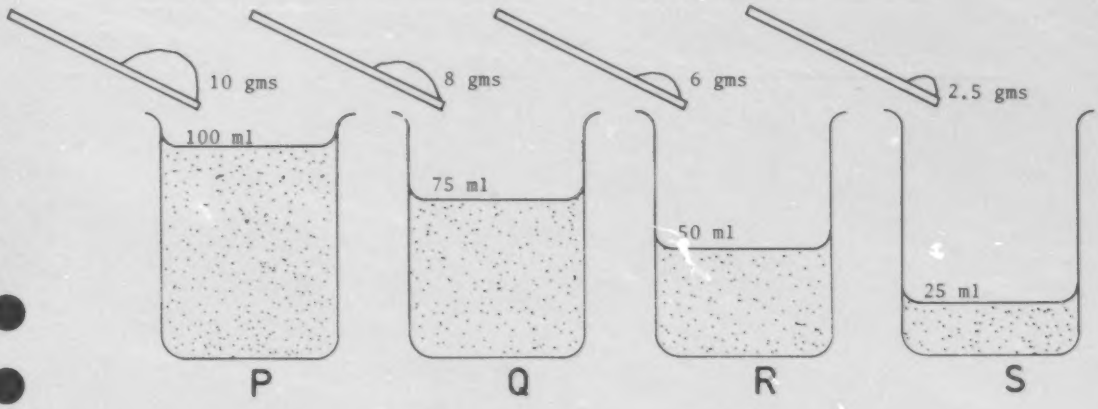
which diagram below best represents the oil-water mixture after centrifuging?



B3. 507

The concentration of a solution is defined as "the amount, in grams, of solid dissolved in 100 ml of water."

Which two solutions below would be the same concentration?



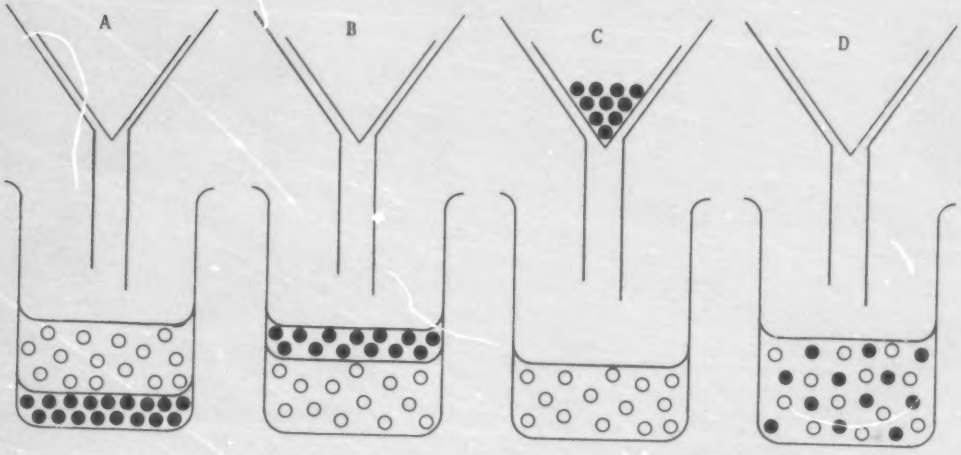
A. P and Q. B. Q and R. C. R and S. D. S and P.

D4. 508

A student dissolved a quantity of methylated spirits in water and then filtered the resulting mixture. Which diagram below best represents the result of this filtration if

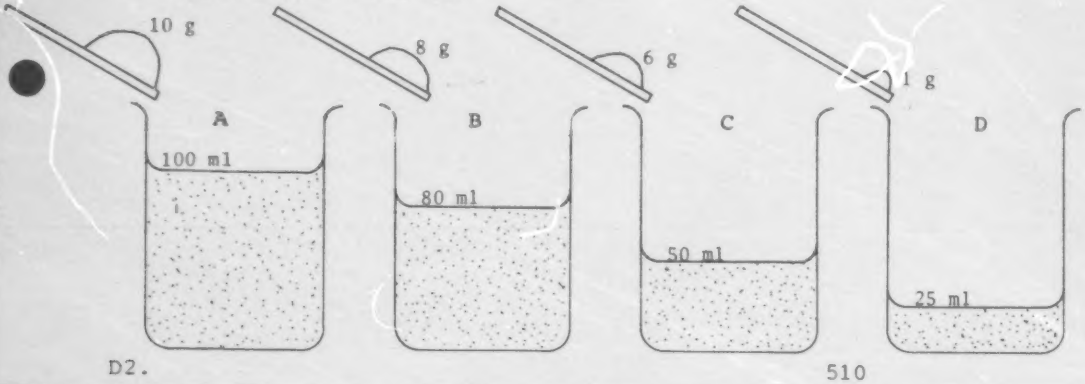
○= water particles

●= methylated spirits particles



D2. 509

Which beaker of water and spatula of salt would make the most dilute solution when mixed?



D2. 510

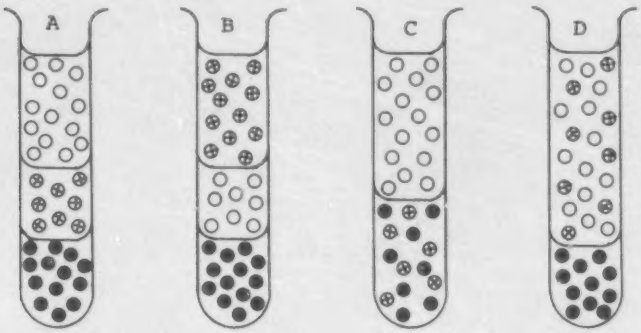
A mixture of water, salt and sand was shaken together in a test tube and the contents allowed to stand.

Which diagram below best represents the form of the resulting mixture?

○ = water particles

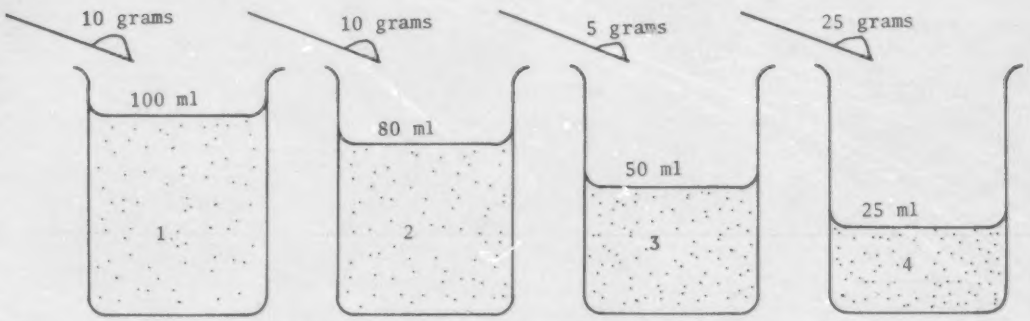
⊗ = salt particles

● = sand particles



D3. 511

Four solutions were made using the amounts of water and salt shown below.

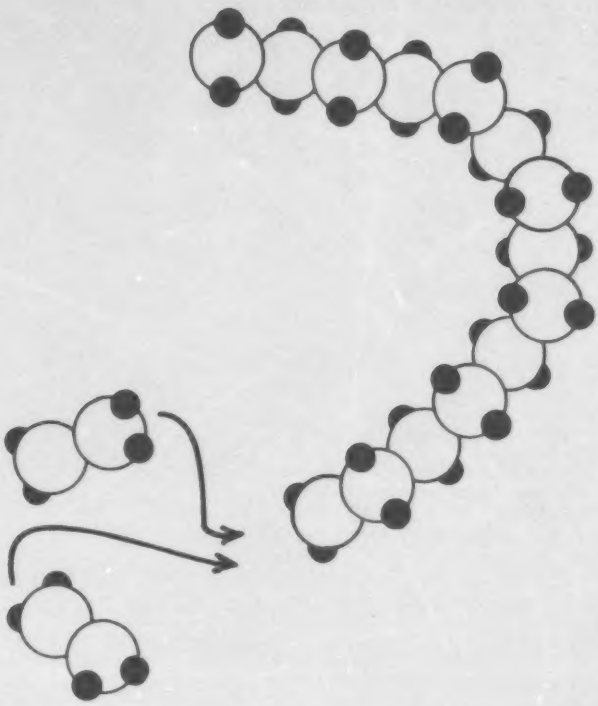


Which statement, referring to these solutions, is correct?

Solution(s)

A. 2 is the most dilute.
B. 1 and 3 have equal concentrations.
C. 1 is the most concentrated.
D. 4 is five times as concentrated as solution 3.

B3. 512



The changes shown in the diagram above give a good representation of what we think happens when

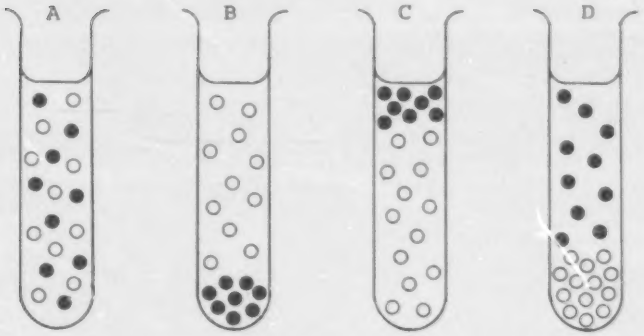
A. a molecule of plastic forms.
B. a worm reproduces.
C. a crystal of salt dissolves in water.
D. a molecule of starch breaks up into sugar.

A3. 513

Which of the diagrams below gives the best idea of what happens when salt and water are mixed together; if these symbols are used:

○= water particles

●= salt particles

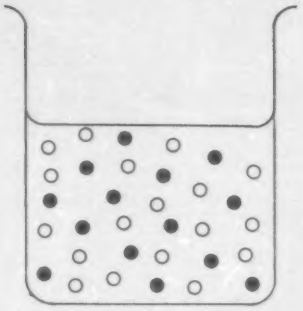


A3. 514

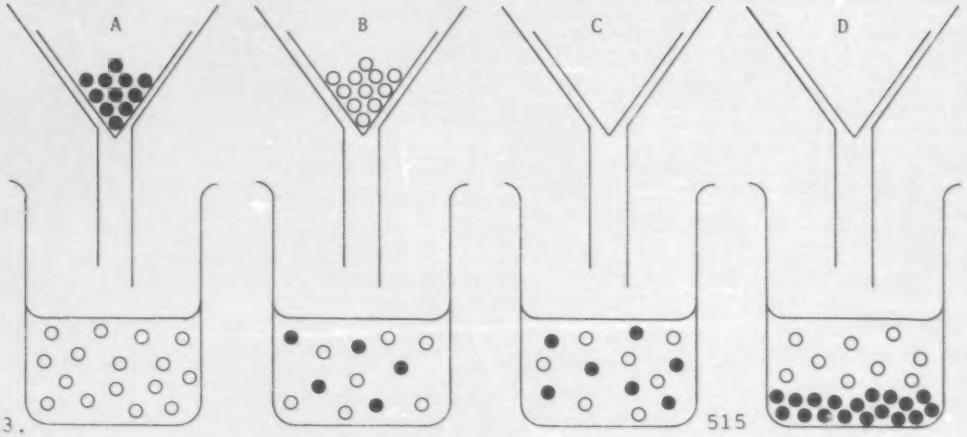
The diagram on the right represents a suspension. Particles of water and suspended solid are shown as:

○= water

●= solid



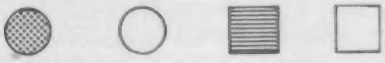
Which diagram below, best represents a filtered suspension.



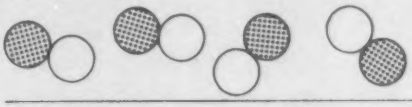
A3. 515

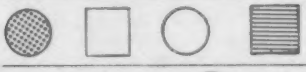
Elements compounds and mixtures are made up of very tiny particles called atoms.

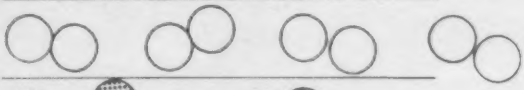
The following symbols can represent different atoms.



Which of the sketches below represents molecules of compounds.

A. 

B. 

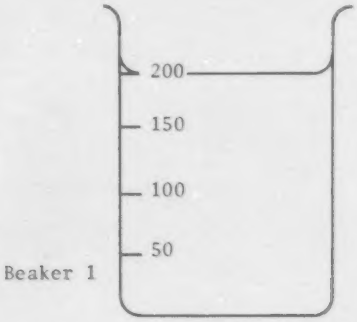
C. 

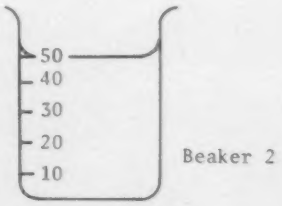
D.

A3.

516

To compare the solubility of two substances a student noted how much of each would dissolve in water using the following apparatus.





He noticed that 15 grams of substance 1 dissolved in the water in beaker 1 and that 5 grams of substance 2 dissolved in the water in beaker 2.

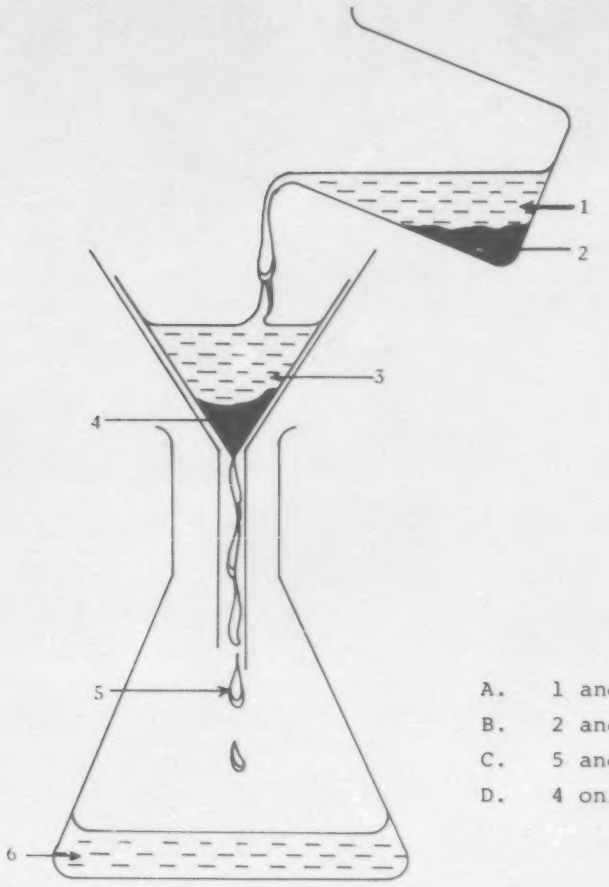
From these results the student could say

A. substance 1 is more soluble than substance 2.
B. substance 2 is more soluble than substance 1.
C. the two substances have equal solubility.
D. nothing because beakers of different sizes have been used.

B1.

517

Which of the substances in the diagram below could be called the filtrate?



A. 1 and 3.
B. 2 and 4.
C. 5 and 6.
D. 4 only.

518

C1.

22. Chemicals A & B are each soluble in water and are made up of charged particles called ions. The ions in Chemical A & B can be represented as shown.

When the two chemicals are mixed together a dense precipitate forms. Which of the following combinations of ions could represent the precipitate;

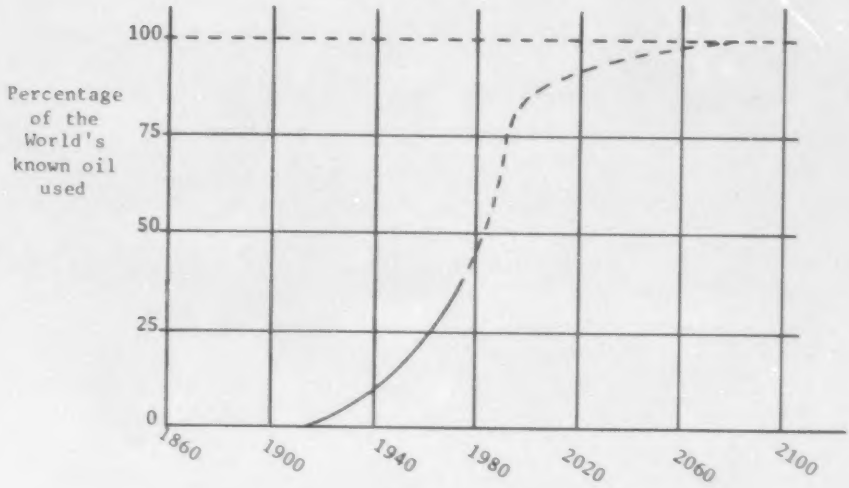
A. ⊕ ⊞
B. ⊖ ⊕
C. ⊖ ⊟
D. ⊖ ⊞

519

D3.

The next two questions refer to the following information.

Present day geologists have estimated that about one quarter of the world's known crude oil reserves was used up between 1910 and 1970. Before 1910 there was virtually no use of crude oil. These facts are represented by the firm line in the graph below. The dotted line represents present day geologists' predictions of the future rate of consumption of the world's remaining known reserves.



According to the graph, the predicted percentage of the world's known reserves which will have been used by the year 2000 is

A. 50% B. 75% C. 85% D. 100%

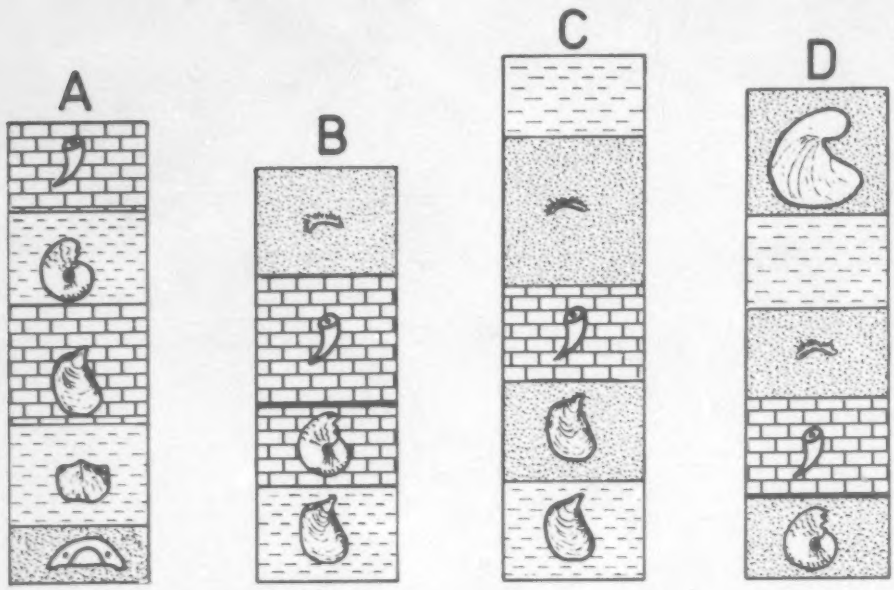
C3. 520

By what year does the graph indicate that all of the world's known oil reserves will be used?

A. 1990 B. 2000 C. 2060 D. 2080

D5. 521

A geologist found fossils in layers of rocks at four different sites. He mapped the layers and fossils as shown below.



Which of the localities bears the oldest fossils?

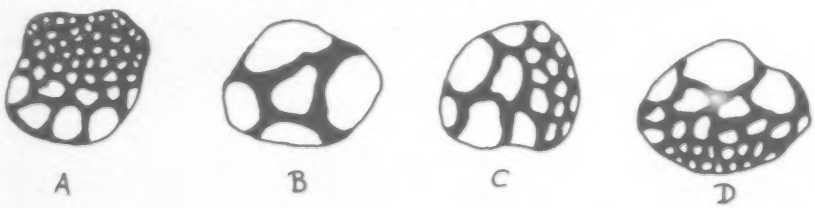
A3. 522

A geologist has decided to analyse some sandstone to find out something about the size of the grains in the sandstone. She will present her results in the form of a graph. Which of these would be the most useful to another geologist?

A. The percentage of particles in each of five ranges of mass.
B. The percentage of particles in each of five ranges of size.
C. The number of particles in each of five ranges of mass.
D. The number of particles in each of five ranges of size.

B1. 523

Which of the rocks drawn below contains a sedimentary feature which suggests that it has been drawn up-side-down compared with the way it was when it was formed?



D2. 524

Coral does not grow in the ocean at depths below 100 metres. However dead coral reefs have been found at depths of 300 metres in the ocean. This information supports the idea that

A. the land surface has eroded.
B. underwater volcanic activity has occurred.
C. the amount of ice at the poles has increased.
D. the crust of the earth has moved.

OR

D3. 525

Coral does not grow below depths of about 100 m. However, old dead coral reefs occur at depths of 300 m in the ocean. It is possible to use this information to support the idea of

A. erosion of the land surface.
B. volcanic activity.
C. movements in the earth's crust.
D. evolution of living things.

C3. 526

The next question refers to this table:

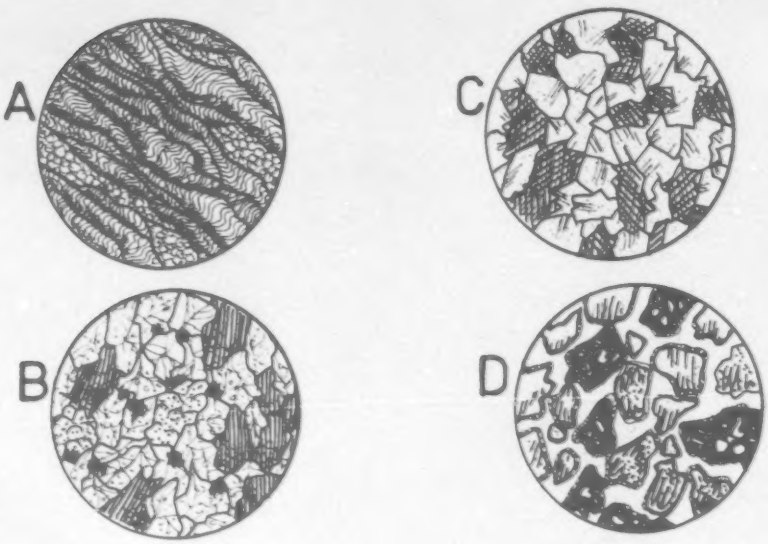
Geological Period	Duration (Mill. years)
Recent	< 1
Pleistocene	1-2
Tertiary	2-65
Cretaceous	65-105
Jurassic	105-145
Triassic	145-195
Permian	195-225
Carboniferous	225-275
Devonian	275-310
Silurian	310-335
Ordovician	335-390
Cambrian	390-500
Precambrian	500-3000

From this table we can say that the Permian period of geological time occurred before the

A. Carboniferous and after the Triassic .
B. Triassic and later than the Devonian.
C. Jurassic and before the Devonian.
D. Silurian and after the Devonian.

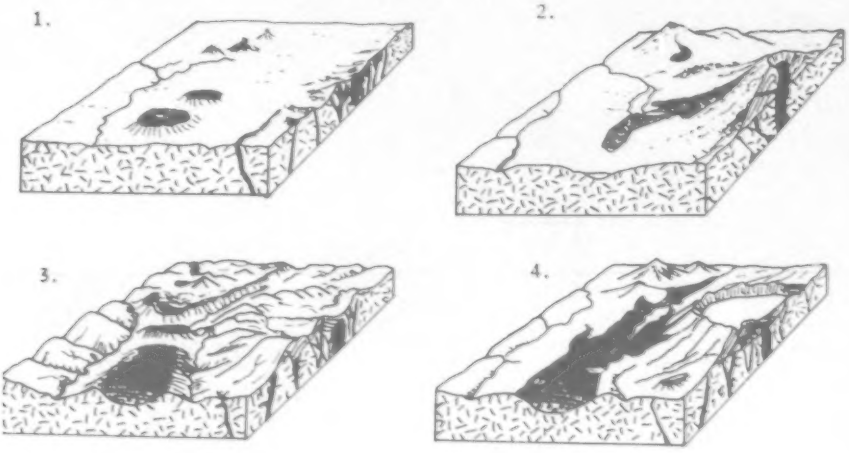
B1. 527

Wells are drilled into rocks which transport water. The diagrams below show four different rock types as seen under the microscope. By careful observation of the diagrams decide which of the rocks would be most likely to carry water.



D2. 528

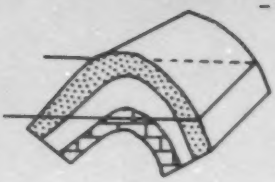
The next question refers to these diagrams of stages in the erosion of a volcanic landscape.

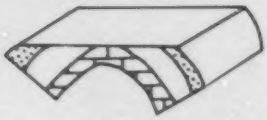


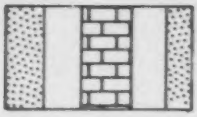
Using all the information which is available in the diagrams, the order of the diagrams, from earliest to latest would be

A. 1, 2, 3, 4.
B. 2, 3, 4, 1.
C. 2, 4, 3, 1.
D. 3, 4, 1, 2.

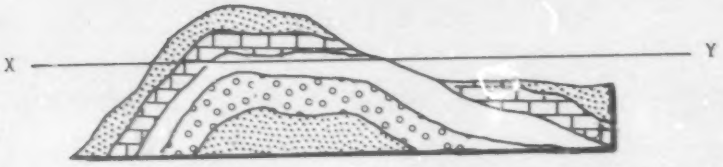
C2. 529

If  was cut through along the

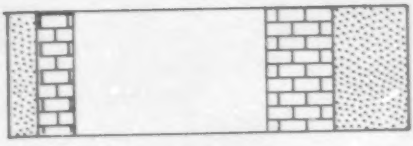
lines drawn to get  , then

from above it would look like 

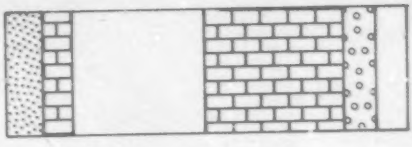
Which diagram below best shows what the surface would look like if erosion occurred to cut the hill drawn below down to the level of the line XY.



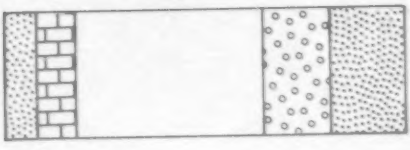
A



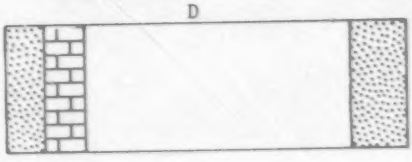
B



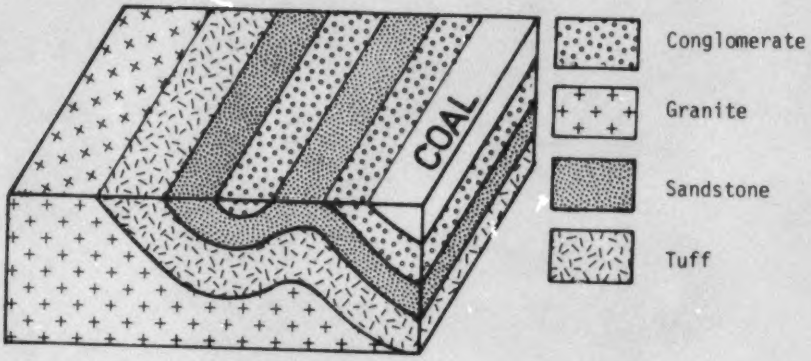
C



D



The next question refers to this geological block diagram.



From all of the evidence available in the diagram, which of the statements below is correct?

A. The granite is the youngest rock.
B. The sandstone is folded into an anticline.
C. The conglomerate is older than the tuff.
D. The coal is the oldest rock shown in the diagram.

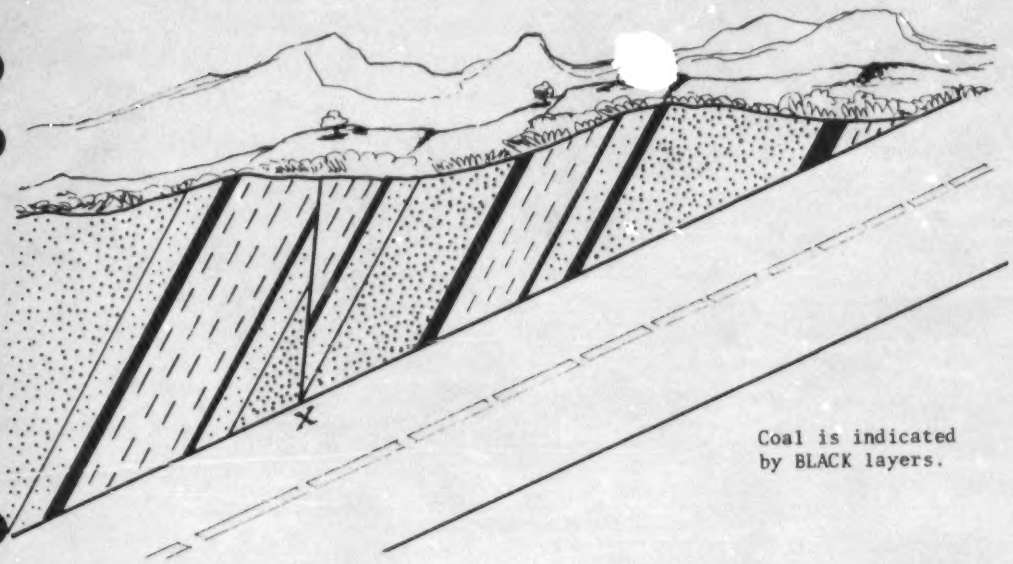
B3 531

A field excursion to study the earth history of the local area is to be undertaken by a class of science students. Which of the following kits of equipment would be the most useful to take on such an excursion?

A. First aid kit, hands lens, glass slides and cover slips, scalpel and scissors.
B. Rock pick, rack of test tubes, weak alkali solution, litmus paper.
C. Topographic map, compass, metric rule, thermometer.
D. Hand lens, rock pick, compass, topographic Map.

D3 532

The next three questions refer to this diagram of part of a road cutting in a coal producing region.



Coal is indicated by BLACK layers.

The type of rock between the coal layers is of sedimentary origin. Of the following statements the <u>one</u> which could <u>NOT</u> be correct is:

A. there are distinct layers in the individual sedimentary rocks.
B. there are deposits of soft clay-like rocks between some layers between the coal layers.
C. individual sand particles can be observed in several layers between the coal layers.
D. several layers between the coal layers are of rock which have been identified as granite.

533

D2.

These layers are tilted. This is most probably because

A. they were originally deposited at this angle.
B. road construction has disturbed the original position of the beds.
C. forces from within the Earth's crust have caused original horizontal layers to become tilted.
D. the road is inclined and only gives the impression of the layers being tilted.

534

C5.

In part of the cutting the layers of coal are separated by a line (marked X) and are not continuous. The best explanation for this would be

A. the coal was formed at different times.
B. layers have cooled at different rates and caused the fracture.
C. pressure from opposite directions has caused movement along a line of weakness.
D. this is where a volcanic dyke has weathered away.

535

C3.

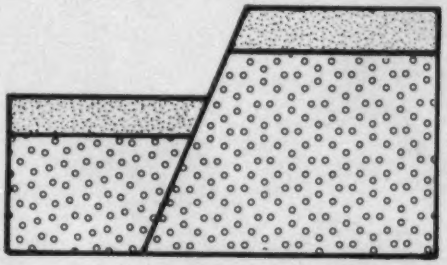
A geologist wishes to know which of a number of rock types is most suitable to be used in the construction of a building. He takes samples of a number of rocks, weighs them and exposes them to high and low temperatures for several weeks. He notices that the surface flakes off some of the rocks and measures the percentage loss in weight for each rock.

For this test to be reliable it would be necessary for the samples to be

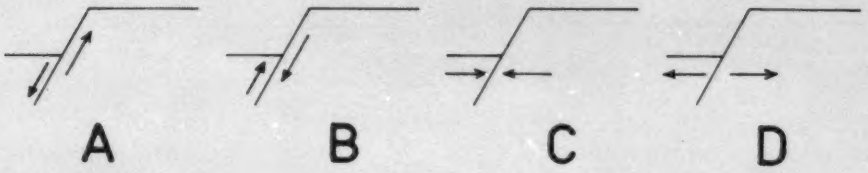
A. of the same weight.
B. from the same locality.
C. of the same shape and size.
D. of the same rock type.

C1. 536

The next two questions refer to this diagram of a geological fault.



Which of the diagrams below shows the directions in which the two blocks moved when the fault was formed?

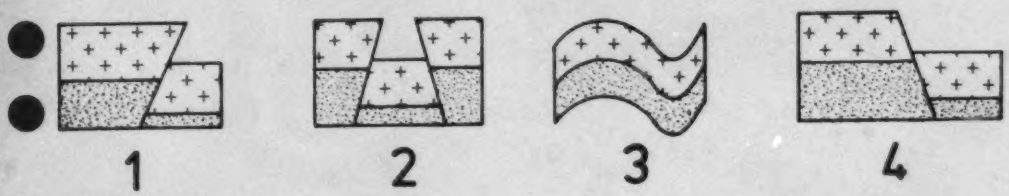


A5. 537

Which of the diagrams above shows the direction of the forces which produced the movement?

D1. 538

The next question refers to these four diagrams.

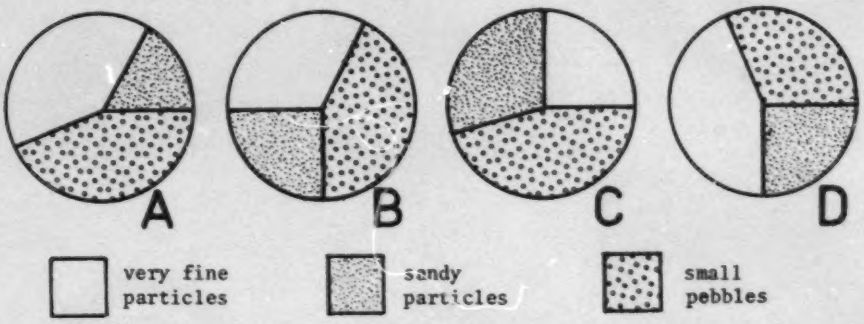


Of the four structures above, the one which could have been caused by stretching (tensional) forces in the crust of the earth is

A. 1 B. 2 C. 3 D. 4

D1. 539

The next question refers to the "pie" graphs below.

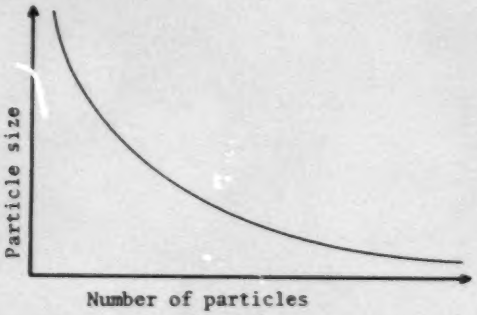


A fine conglomerate was examined and found to be composed of approximately 45% small pebbles, 25% sandy particles and 30% very fine particles.

Which graph above could best represent this conglomerate?

B3. 540

A student observed a small piece of a sedimentary rock with the intention of finding out the sizes of the particles which composed the rock.
He graphed the result as follows:



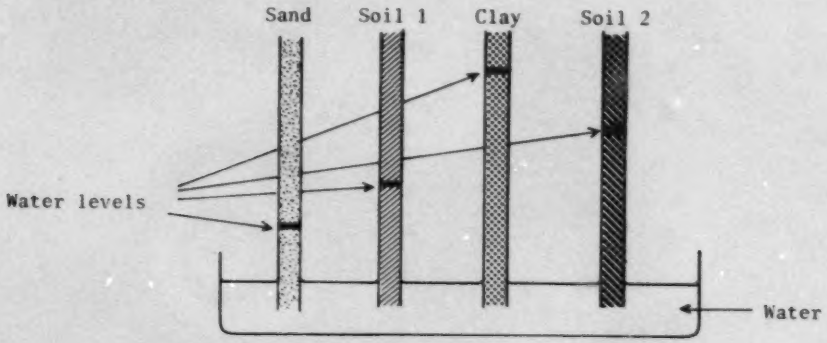
These results mean that the rock he was studying

A. had more large particles than small particles.
B. contained a large number of particles of all sizes.
C. was most probably a sandstone or a shale.
D. was composed of a variety of particles.

D3. 541

The next question refers to this information.

The diagram below shows several glass tubes containing various substances immersed in water. The height to which the water has risen is also shown.



What would be the most likely composition of soil 2 compared with soil 1?

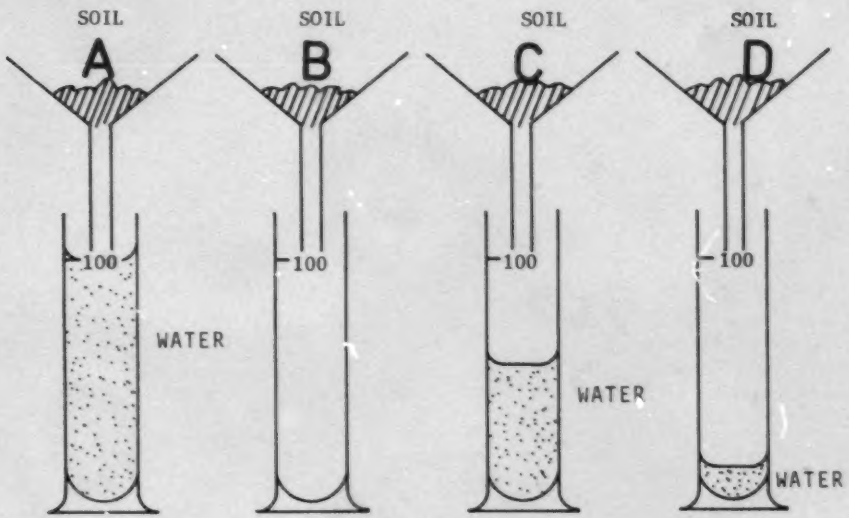
A. Soil 2 has more clay and more sand than soil 1.
B. Soil 2 has less clay and less sand than soil 1.
C. Soil 2 has more clay and less sand than soil 1.
D. Soil 2 has less clay and more sand than soil 1.

C3.

542

102

The next question refers to these diagrams.



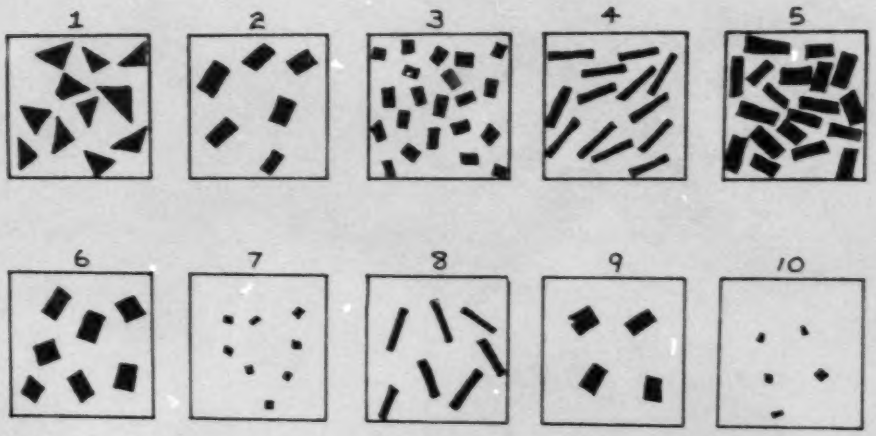
50g of four different soils, (A, B, C, D) were placed in four separate filter funnels. 100ml of water was poured into each filter funnel, and the water passing through the soil was collected in a measuring cylinder as shown.
Sandy soil is known to <u>retain</u> very little water. Which of the soils above (A, B, C or D) could be a sandy soil?

A3. 543

The next four questions refer to the diagram and information below.

Identifying rocks often depends on estimating the percentage of each mineral present.

Look at the diagram below and answer the questions which follow.



1. Which square has a black spot percentage of 10%?

A. 2
B. 3
C. 4
D. 5

A5. 544

---

2. Square 5 has a black percentage closest to

A. 30
B. 50
C. 70
D. 90

B1. 545

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3. Which of the squares mentioned below has the greatest percentage of black?

A. 1
B. 3
C. 4
D. 5

D5. 546

---

4. Which squares mentioned below have the same percentage of black colouring?

A. 2 and 3.
B. 2 and 6.
C. 5 and 6.
D. 7 and 10.

B4. 547

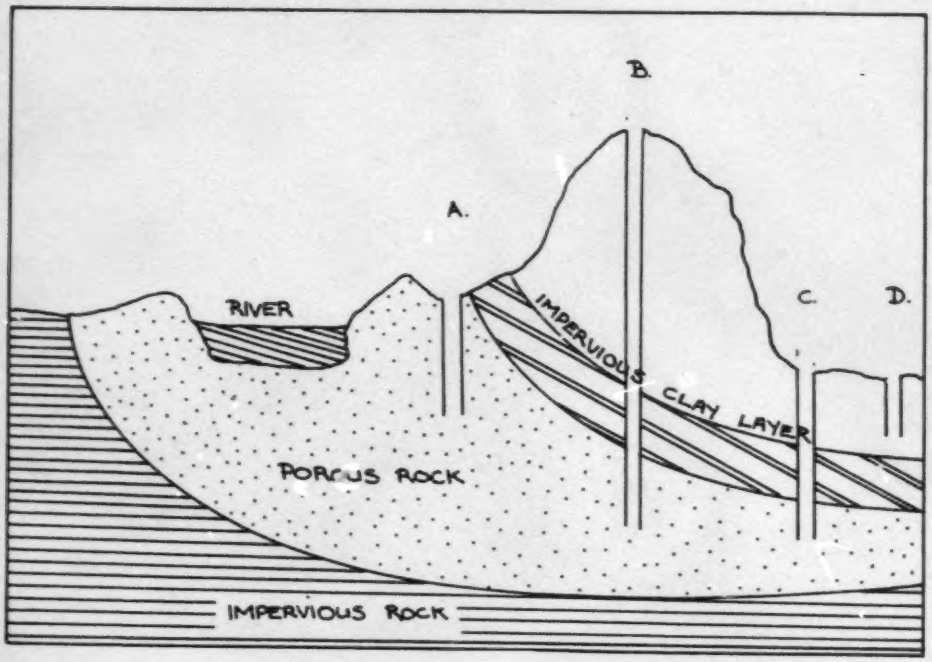
A geologist makes the following four statements about an outcrop of rock on a hillside.

Which statement contains conclusions or deductions *without any observations?*

A. The sedimentary rock was deposited in marine conditions millions of years ago.
B. The outcrop consists of layers which vary in thickness from 3cm to 2m.
C. The sedimentary rock contains fossil shells millions of years old.
D. The sandstone layers contained vertical cracks.

A3. 548

The next question refers to this diagram.



This diagram shows an artesian basin.
Wells are sunk at A, B, C and D as shown. Assuming that the porous rock is saturated with water, the well from which water will flow freely is

A. A B. B C. C D. D

C1. 549

The next four questions refer to this information.

A committee is trying to select the best way of generating electricity in the Ugly Islands. They have four different methods which they are considering, and they have asked an expert for the answers to four questions. The four methods are

A. burning coal.
B. using solar cells.
C. using a nuclear reactor.
D. burning wood.

Choosing from A, B, C and D above, what would be the answers of the expert to these questions?

Which method *does not* involve generating steam?
B2. 550

Which method uses a fossil fuel?
A4. 551

Which method produces the *most dangerous* wastes?
C5. 552

Which method costs the *least* after it is set up?
B3. 553

Four energy sources which are used now, or which are likely to be used in the future are coal, oil, uranium and solar power. The next three questions refer to these energy sources.

How many of the sources can be called "fossil energy"?

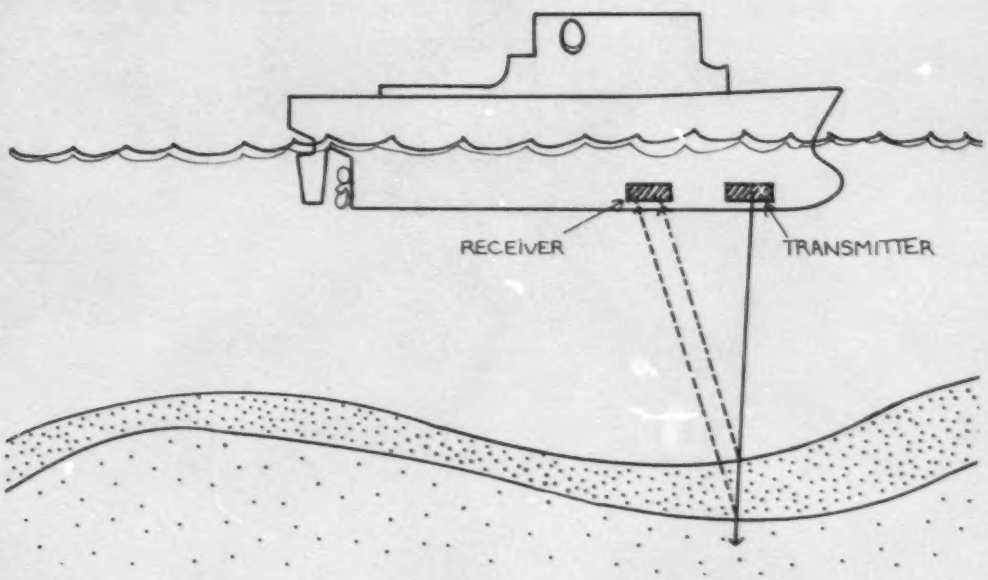
A. None. B. One. C. Two. D. Three.
C3. 554

In terms of the next thousand years or so, how many of the sources may be regarded as renewable?

A. One. B. Two. C. Three. D. Four.
A2. 555

Which source causes the LEAST amount of pollution?

A. Coal. B. Oil. C. Uranium. D. Solar power.
D5. 556



The diagram above shows a trawler fitted with a device used to determine the depth of the water. The device is called an "echo sounder". What is being transmitted to the bottom and being reflected back to the receiver?

A. Sound waves.
B. Light waves.
C. Electric current.
D. S-waves.

A5. 557

There are many ways in which energy can be sent from one place to another. Some of these are listed below in two groups:

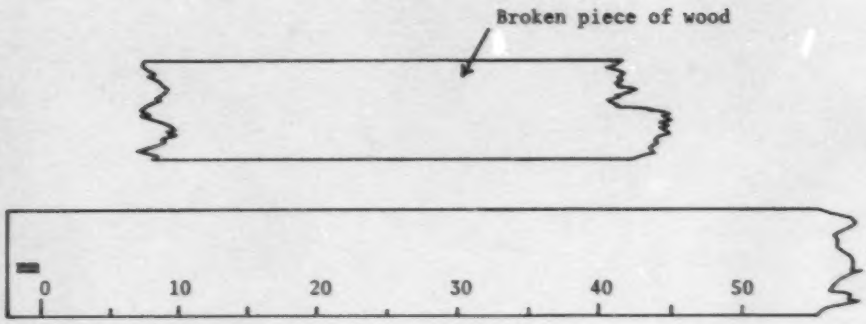
GROUP 1	GROUP 2
Sound waves Earthquake waves	Radio waves Light waves

Which of the following statements about the behaviour of these waves is correct?

	GROUP 1	GROUP 2
A.	Can be detected by the human body.	Cannot be detected by the human body.
B.	Cannot carry energy through empty space.	Can carry energy through empty space.
C.	Can carry information as well as energy.	Cannot carry information as well as energy.
D.	Cannot be reflected or refracted.	Can be reflected and refracted.

B1. 558

This question refers to this picture.

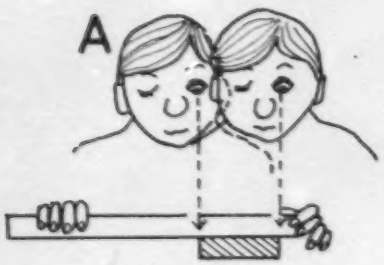


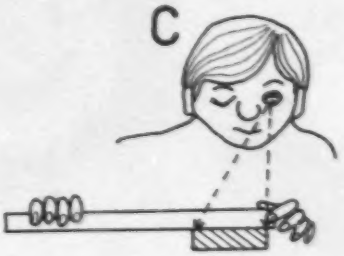
A student wishes to cut a rectangular piece of wood from the broken piece pictured above the enlarged millimetre scale. The longest piece he could expect to obtain would be

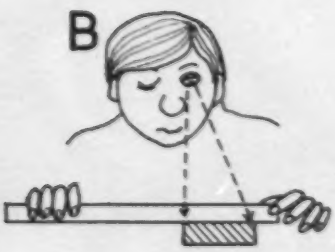
A. 10mm. B. 30mm. C. 40mm. D. 45mm.

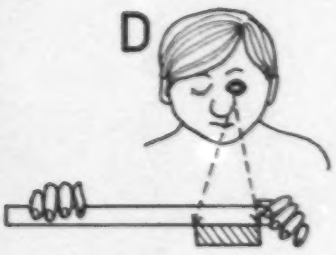
B5. 559

Which student in the drawings below could make the most accurate measurement of the shaded object?



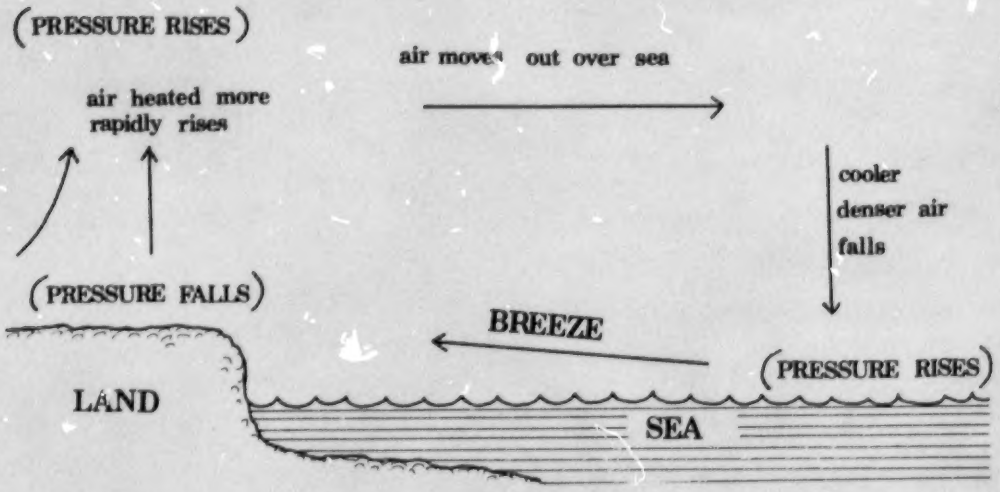






A3. 560

The next question refers to this diagram.



This diagram indicates the formation of a

A. land breeze on a summer afternoon.
B. convection cell on a summer morning.
C. sea breeze on a summer afternoon.
D. conduction cell on a summer morning.

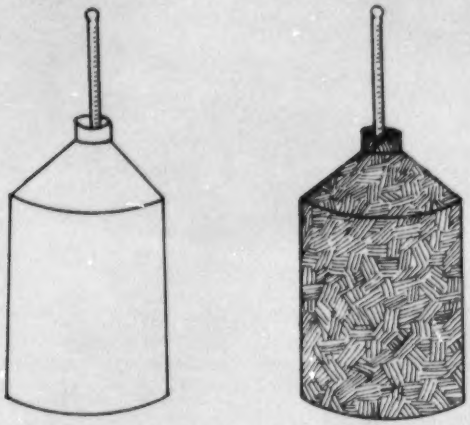
C4. 561

Which one of the following statements about heat transfer is correct?

A. Convection is the process of heat transfer through liquids only.
B. Conduction is the process of heat transfer through metals only.
C. Conduction occurs through the transfer of the material itself.
D. Radiation requires no material medium for the transfer of heat.

D1. 562

The next question refers to this diagram.



The diagram shows two empty cans which are identical in every way except that one is painted white whilst the other is painted black. Each can contains a thermometer. If they were placed outside in the sun, you would expect the

A. black one to heat up faster because black surfaces absorb all the colours of the spectrum.
B. black one to heat up slower because black absorbs none of the colours of the spectrum.
C. white one to heat up faster because the colour white contains all the colours of the spectrum.
D. white one to heat up slower because the colour white absorbs all the colours of the spectrum.

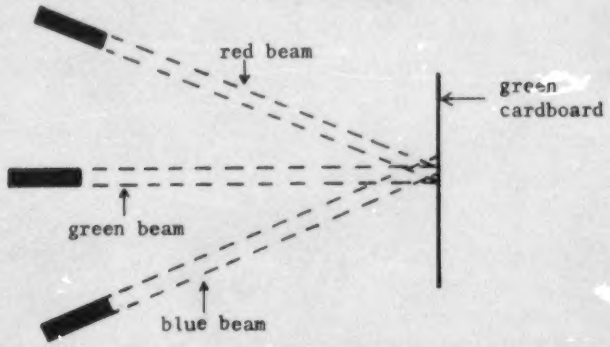
A5. 563

A boy throws a stone into a stationary lake. Which waves from this will reach him first?

A. Light reflected from the splash.
B. The sound of the splash.
C. Water waves caused by the stone.
D. Compression waves through the water.

A3. 564

The next question refers to this diagram.

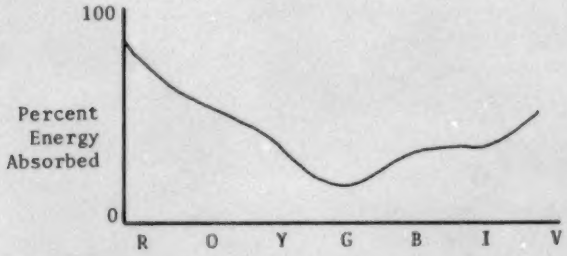


In the experiment shown above, beams of red, green and blue light were shone onto a piece of green cardboard. The cardboard would appear

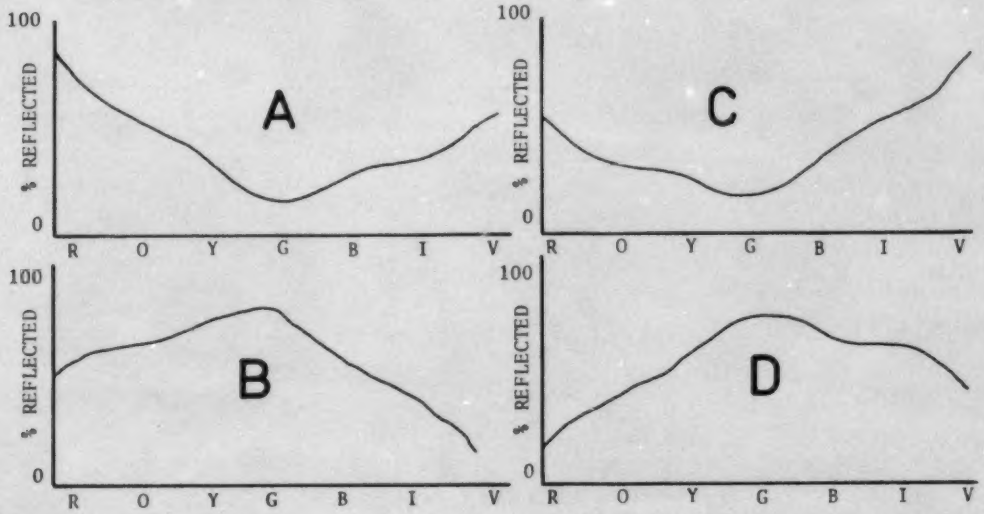
A. red. B. green. C. blue. D. white.

B2. 565

The graph below shows the percentage of radiant energy absorbed by the various colours in the spectrum, as painted on squares of cardboard.

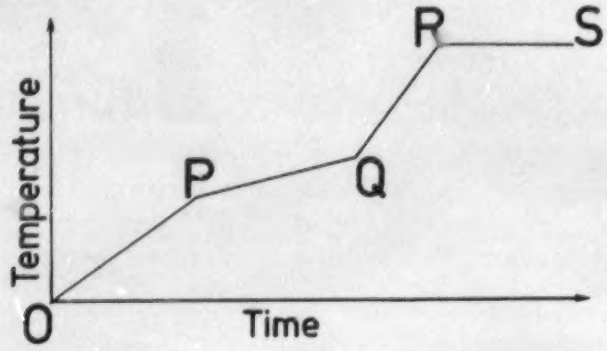


Which graph (below) shows the radiant energy reflected by the same colours on the same cards.



D3. 566

The next two questions refer to the graph below which shows the changes in temperature when a mixture of two liquids is distilled.



Which section of the graph marks the evaporation of the liquid with the lowest boiling point?

A. OP B. PQ C. QR D. RS

B2. 567

At which point on the graph did distillation of the second liquid start?

A. P B. Q C. R D. S

C1. 568

"The atmosphere can be considered as one enormous engine, charged by the energy of the sun. The wind, cloud, rain, and so on that comprise weather are the visible signs of this engine at work as it pumps energy from place to place."

Which of the following words best describes the form of the sun's energy that runs this machine?

A. Ultraviolet.
B. Light.
C. Heat.
D. Potential.

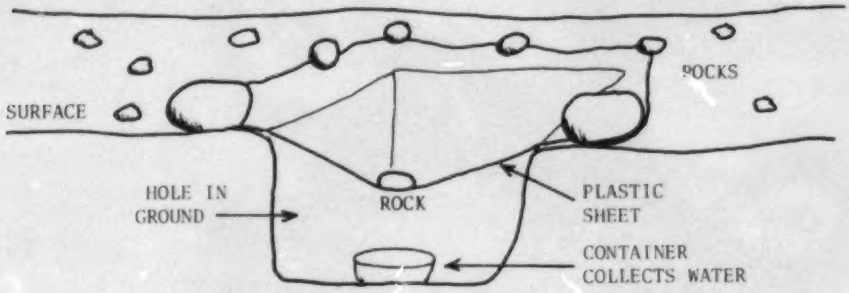
C1. 569

Imagine you are looking at two diagrams of two sound waves. The two sounds are exactly the same, except that one is louder than the other. The louder wave would have a larger

A. amplitude.
B. frequency.
C. speed of vibration.
D. wave length.

A2. 570

Pure water can be obtained from the desert using the following equipment.



This procedure involves which of the following processes?

A. Condensation and filtration.
B. Evaporation and condensation.
C. Evaporation and filtration.
D. Filtration and precipitation.

B3. 571

Which one of the following processes would be the most suitable for obtaining the salt from sea water?

A. Centrifuging.
B. Distillation.
C. Evaporation.
D. Filtration.

C3. 572

Which method would be best to separate a mixture of an insoluble solid and a liquid?

A. Crystallisation.
B. Distillation.
C. Evaporation.
D. Filtration.

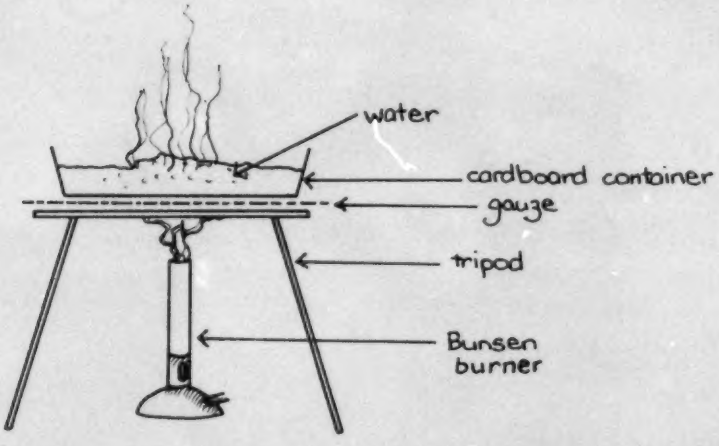
D3. 573

In which of the household appliances mentioned is the heating element used to separate one substance from another?

A. Pressure cooker.
B. Clothes dryer.
C. Toaster.
D. Electric heater.

B2. 574

A student set up the apparatus shown below. He lit the Bunsen burner and noticed that the cardboard container did not ignite.

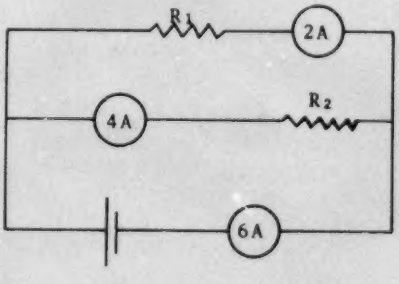


Which statement best explains why the cardboard does not ignite?

A. Gauze conducts the heat away from the cardboard.
B. The water puts out any fire before it starts.
C. Asbestos in the gauze keeps the cardboard cool.
D. Water stops the temperature rising above 100°C.

D1. 575

The next question refers to this diagram.



The diagram shows the readings on three ammeters in an electrical circuit which contains two resistances and a battery.

What is the total current drawn from the battery?

A1. A. 6 amps. B. 8 amps. C. 10 amps. D. 12 amps. 576

The information below could refer to the next two questions.

The mathematics of electrical circuits, in part, can be summarised, using I for current, V for potential difference, and R for resistance:

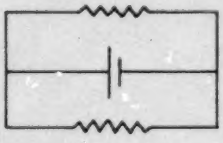
a) Series Circuit Theory

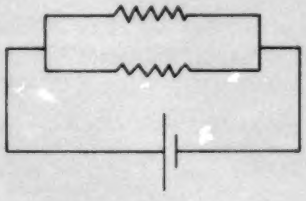
$$I = I_1 = I_2 = \ldots$$
$$V = V_1 + V_2 + \ldots$$
$$R = R_1 + R_2 + \ldots$$

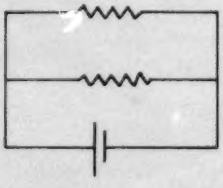
b) Parallel Circuit Theory

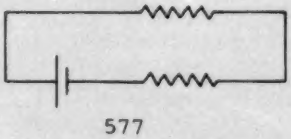
$$I = I_1 + I_2 + \ldots$$
$$V = V_1 = V_2 = \ldots$$
$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \ldots$$

Which of the circuits drawn below could be used to test the Series Circuit Theory?

A 

C 

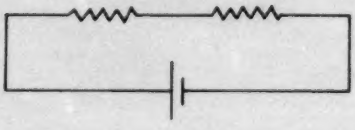
B 

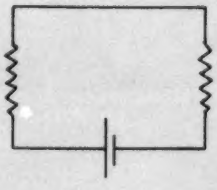
D 

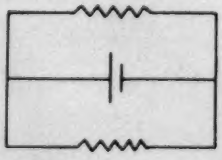
D1.

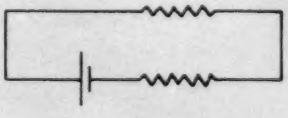
577

Which circuit would be most suitable to use in an experiment to determine that $I = I_1 + I_2$?

A 

C 

B 

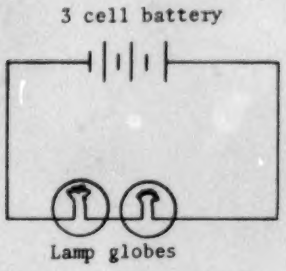
D 

B2.

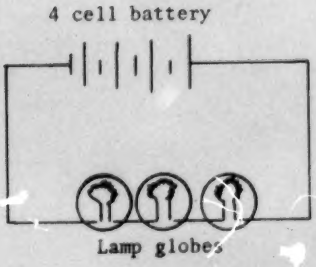
578

In which of the following circuits will the lamp be likely to glow most brightly? The components of each circuit are identical.

A.

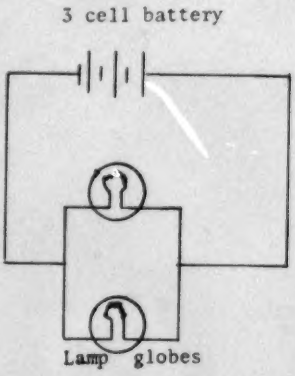


B.

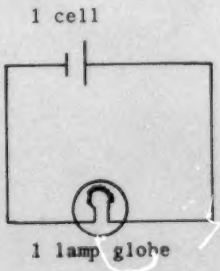


C1.

C.

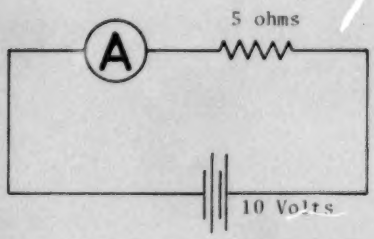


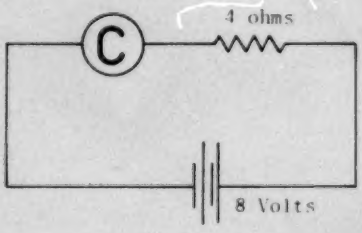
D.

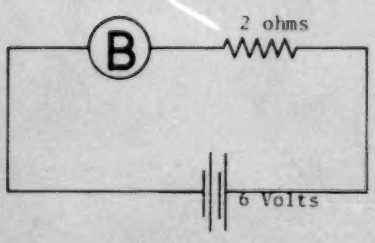


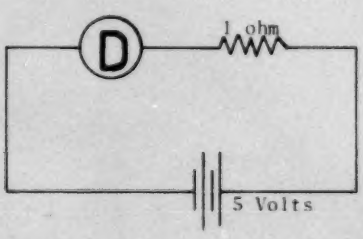
579

The next question refers to these four diagrams.









Which ammeter, A, B, C or D would indicate the largest flow of current?

D1.

580

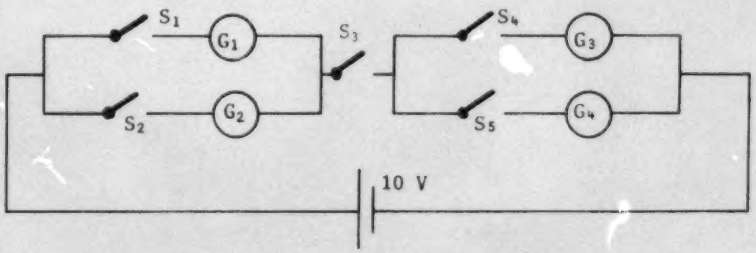
Manufacturers of incandescent light globes remove all oxygen from inside the globe, and in some cases refill it with nitrogen. The presence of oxygen would

A. prevent the metal element from glowing.
B. cause the metal element to burn.
C. allow the electric current to escape through the globe.
D. present too great a resistance for the electric current to flow.

581

B3.

The next three questions refer to this diagram.



The circuit above contains five switches (S_1 to S_5) and four identical globes (G_1 to G_4).

Which switches would need to be closed to switch on globes G_2 and G_3 only?

A. S_2 and S_3.
B. S_1, S_2, S_3 and S_4.
C. S_2, S_3 and S_4.
D. S_1, S_2, S_3, S_4 and S_5.

582

C3.

If switches S_1 and S_4 were closed, which globes would light up?

A. G_1 and G_4 only.
B. G_1 and G_3 only.
C. G_1, G_2 and G_3 only.
D. No globes would light up

583

D3.

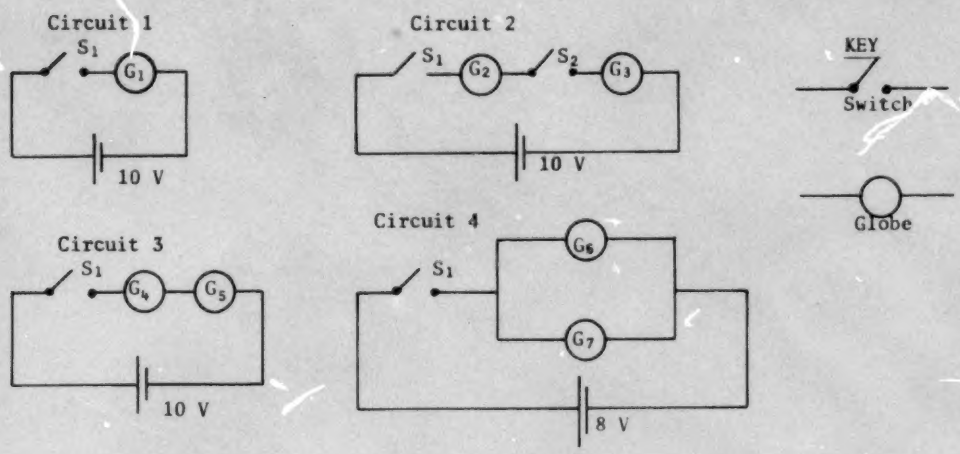
Which statement concerning the circuit is correct?

A. Globes G_1 and G_3 are connected in parallel with globes G_2 and G_4.
B. Globes G_1 and G_3 are connected in series. So are globes G_2 and G_4.
C. Globes G_1 and G_2 are connected in parallel with globes G_3 and G_4.
D. G_1 and G_2 are connected in parallel. So are G_3 and G_4.

584

D1.

The next four questions refer to the following diagrams



If in each of the circuits above, switch 1 (S_1) were closed, what total number of globes would be alight?

A. 3 B. 4 C. 5 D. 6

C2. 585

If all switches were closed, which globe would glow brightest?

A. G_1 B. G_3 C. G_5 D. G_7

A4. 586

Which globes would glow with equal brightness? (Assume all switches are closed).

A. G_1 and G_6 and G_7.
B. G_2 and G_3 and G_4 and G_5.
C. G_2, G_3, G_4, G_5, G_6 and G_7.
D. G_4 and G_5 and G_6 and G_7.

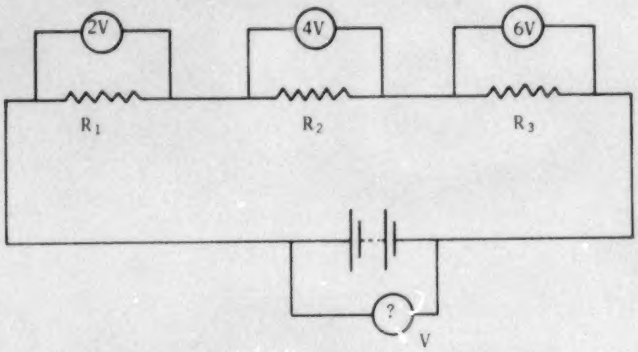
B1. 587

If any three switches were to be closed, what maximum number of globes could be on?

A. 3 B. 4 C. 5 D. 6

C3. 588

The diagram below refers to the next question.



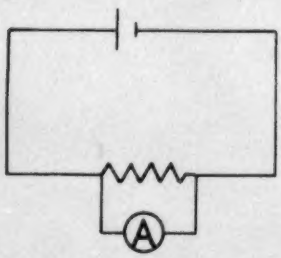
The diagram shows the readings on three voltmeters connected across three resistances.
What would be the scale reading on the voltmeter (V) connected across the battery?

A. 2 V. B. 8 V. C. 10 V. D. 12 V.

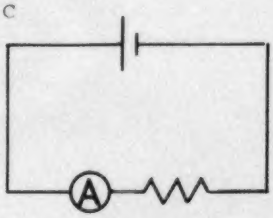
D3. 589

Of the circuits shown below the one which correctly measures the current flowing in the resistor is:

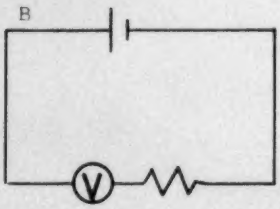
A



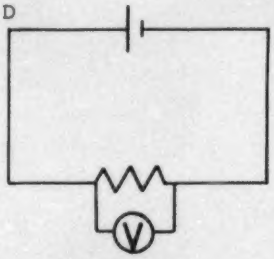
C



B



D

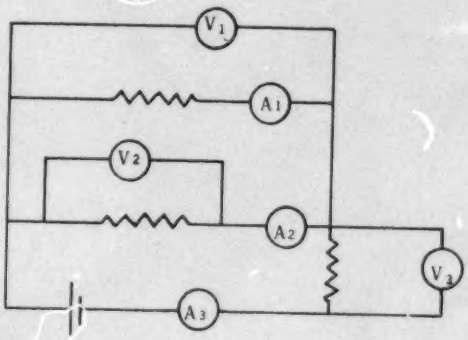


C1. 590

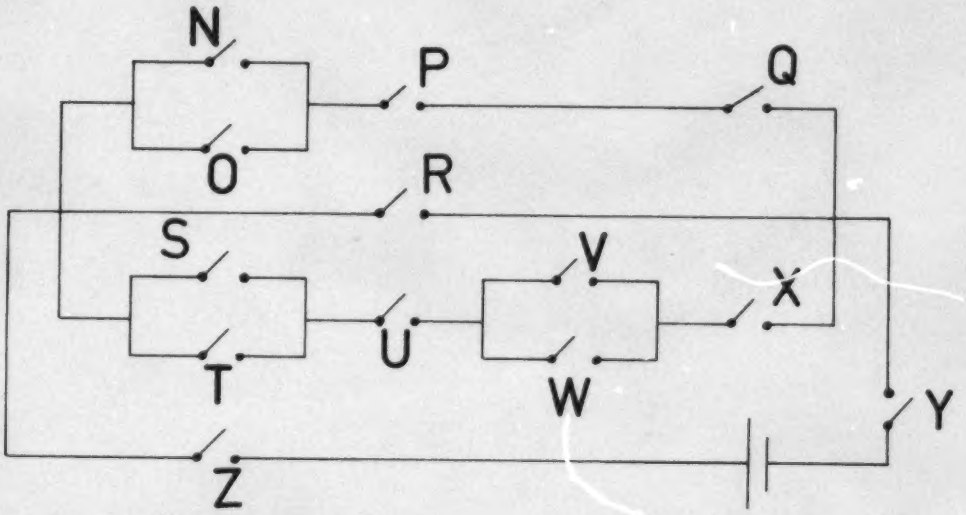
The next question refers to this circuit diagram.

A student wished to determine the current drawn from the battery. Which meter(s) must he need?

A. A_1 and A_2 and A_3.
B. V_1 and V_2 and V_3.
C. All 6 meters.
D. A_3 only.



D2. 591

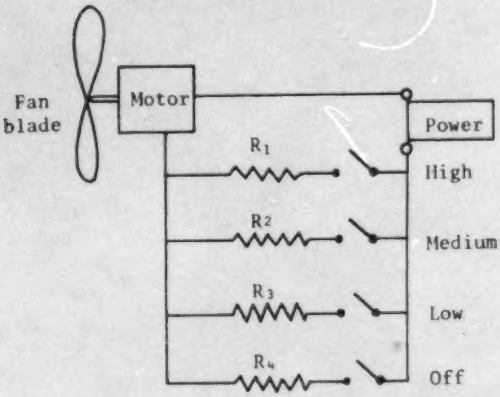


If a current is to flow in the circuit drawn above, which switches must be closed?

A. N, O, P, Q, Y.
B. Z, R, Y.
C. S, T, V, W, Y, Z.
D. R, S, T, U, V, W, X.

B2. 592

The diagram refers to the question below.



The diagram shows a possible circuit for an electric fan with four (4) different speed switches.

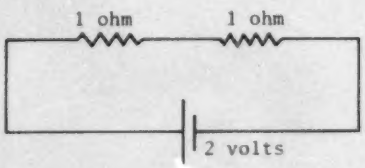
Which statement concerning this circuit is true?

A. Since more current is required for a high fan speed, R_1 must be the largest resistance.
B. When the fan is switched to the off position, current flows in R_4 only.
C. The current flowing through R_3 would be larger than the current in R_2.
D. The lower the resistance, the faster the fan blade will turn.

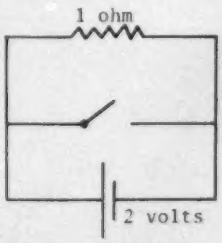
D3. 593

In which circuit below would 2 amp of electrical current be flowing?

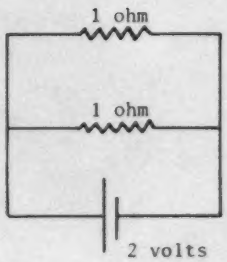
A



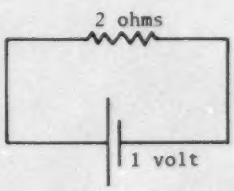
C



B



D



C1. 594

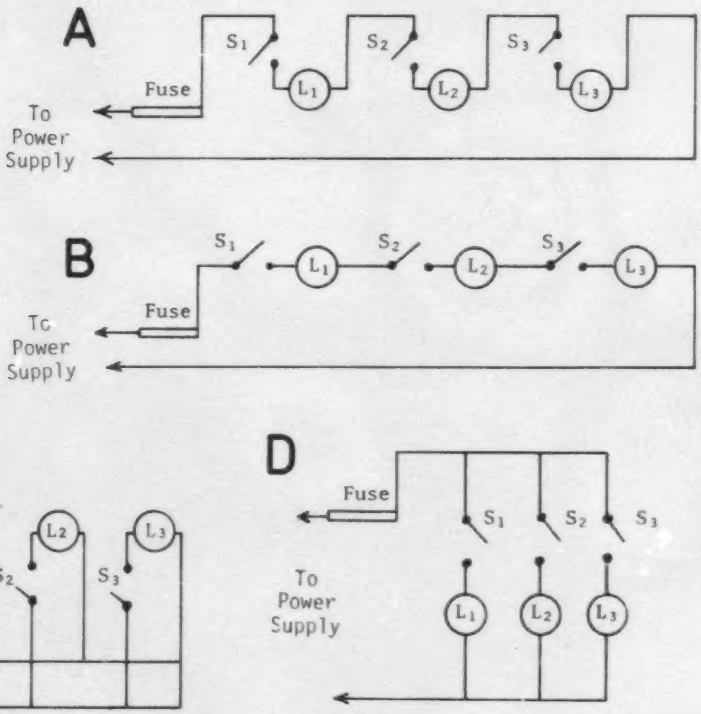
The purpose of the 'earth' wire in a power cord is to

A. remove excess electricity from the circuit.
B. conduct electricity from the earth to the appliance being used.
C. conduct electricity away from the appliance in the case of a 'short'.
D. remove the risk of electrocution by not allowing any current to get to the appliance.

C1. 595

The diagrams show four different circuits for wiring three different lights (L_1, L_2, L_3) in three different rooms of a house, NOT all of each circuit is shown.

Which circuit would allow <u>any one</u> light to be switched on? (All other circuits would need <u>all</u> lights on before any would come on.)



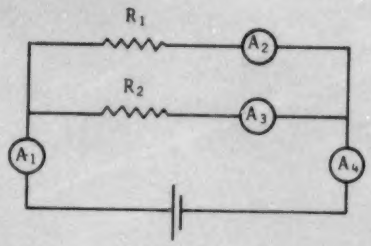
D1. 596

Look at the circuit diagram on the right. Which ammeter is best placed to measure the current flowing in R_2?

A. A_1 C. A_3

B. A_2 D. A_4

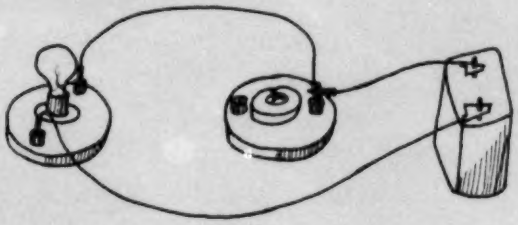
C4.



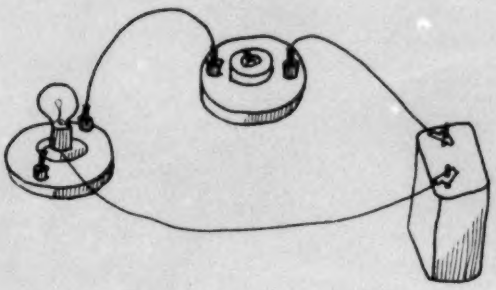
597

Which of the electrical circuits shown, A, B, C, D, is correctly wired to allow the lamp to light up?

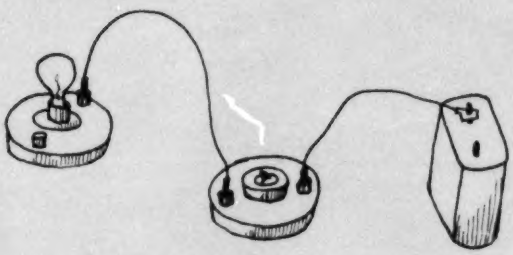
A.



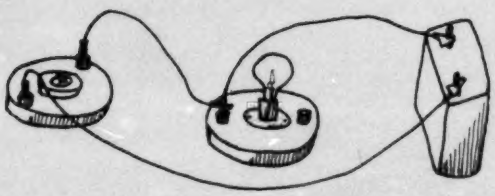
B.



C.



D.



B5.

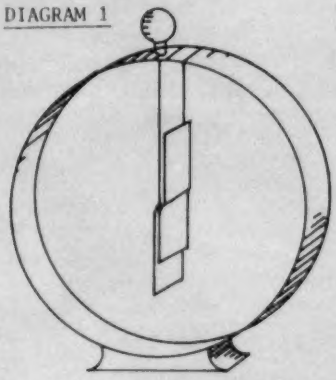
598

The next question refers to this information.

DIAGRAM 1

shows an uncharged electroscope. Electroscopes are used to detect charges.

DIAGRAM 1



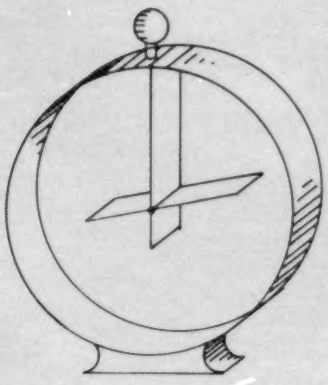


DIAGRAM 2

This electroscope is carrying an UNKNOWN charge.

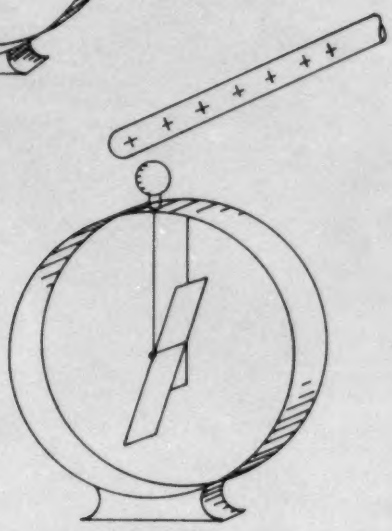


DIAGRAM 3

When a positively charged rod is brought near the conducting knob of the electroscope with the UNKNOWN charge the leaves of the electroscope collapse as shown.

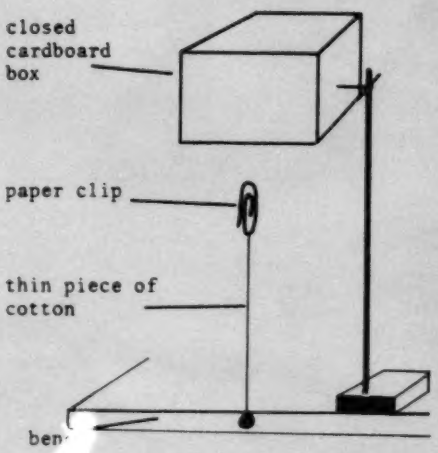
From the information above, we may conclude that the unknown charge

A. is definitely positive.
B. is definitely negative.
C. might be either positive or negative.
D. cannot be determined until you touch the knob with the charged rod.

B1. 599

This question refers to the diagram on the right.

An ordinary metal paper clip is stationary in air just below a closed cardboard box. It is held in position by a thin piece of cotton attached to the bench.



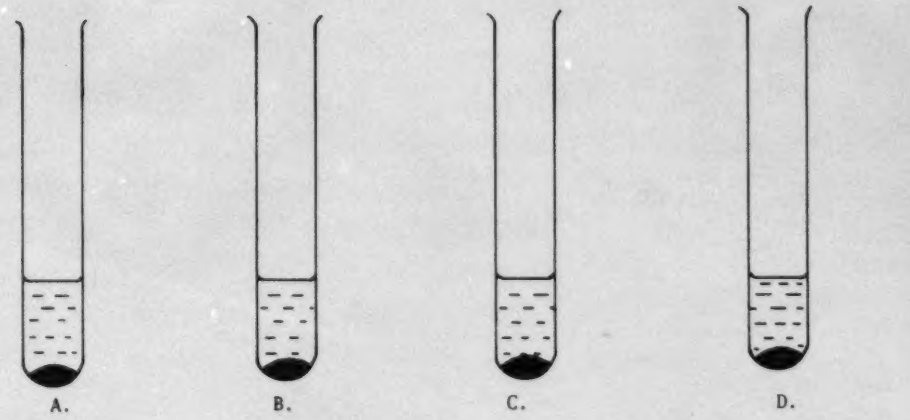
If the cotton were cut, the clip would

A. rise up to the box.
B. fall to the bench.
C. not move from its position.
D. float away sideways.

A1.

600

An experiment was conducted to test the rate of solution of sugar in water under different conditions. Equal quantities of sugar were added to equal volumes of water in the test tubes A, B, C and D. The test tubes were then treated as follows:



Which test tube could be used as an experimental control?

A3.

601

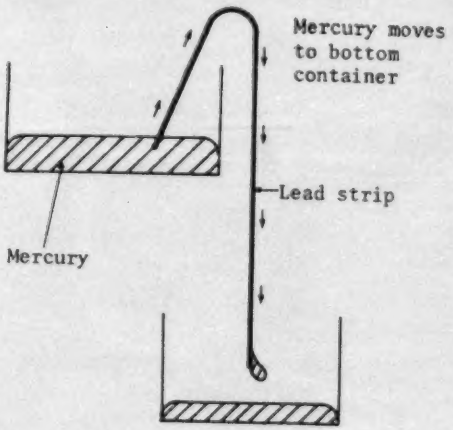
Four substances from the planet Xenos were given various identifying tests by scientists. The results of some of these tests are listed below.

Substance	Able to be bent	Conduct Electricity	Conduct Heat	Brittle
A	YES	YES	YES	NO
B	YES	YES	NO	YES
C	YES	NO	YES	YES
D	NO	YES	YES	YES

On the basis of this information, which substance is most similar to a metal?

A4. 602

This apparatus was set up and left to stand for several days. At the end of this time it was observed that the mercury had transferred from the top container to the bottom container.



This experiment would best be described as

A. a mercury siphon.
B. the mercury pump.
C. evaporation of mercury.
D. diffusion of mercury.

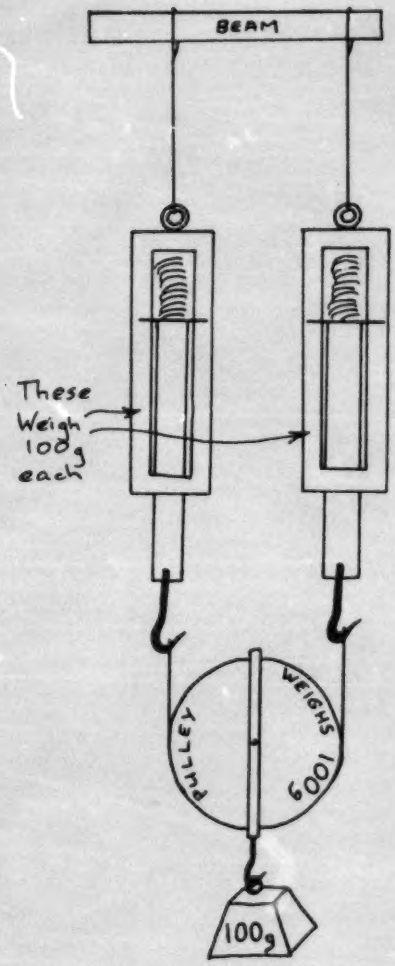
A2. 603

A porthole in an aluminium frame was carefully fitted into the steel hull of a ship. In spite of neat fitting, water leaked into the cabin.

Which statement below best accounts for this?

A. Aluminium forms a protective coating which changes the size of the porthole.
B. Iron and aluminium expand at different rates.
C. The iron rusts quickly in sea water and lets the water in.
D. Hotter air inside the cabin expands the aluminium more than the iron.

B3. 604



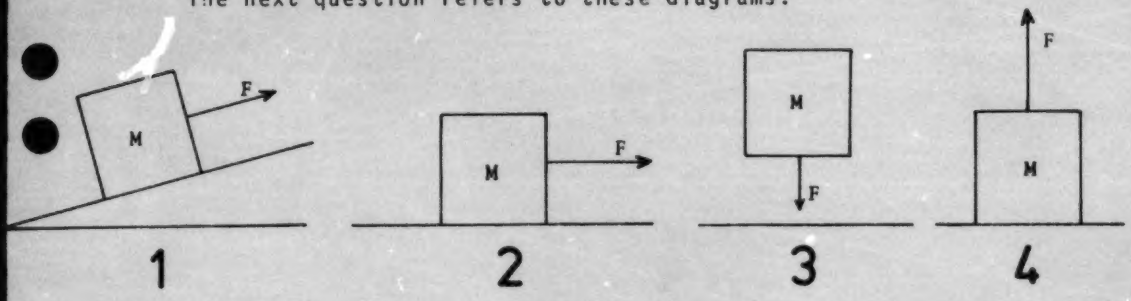
The diagram opposite shows a beam supporting two spring balances and a pulley off which is hanging a mass. The spring balances weigh 100 grams each. The pulley weighs 100 grams and the mass hanging off the pulley weighs 100 grams.

From this situation we can definitely conclude that the spring balances indicate identical readings of:

A. 100 grams.
B. 200 grams.
C. 300 grams.
D. 400 grams.

A1. 605

The next question refers to these diagrams.

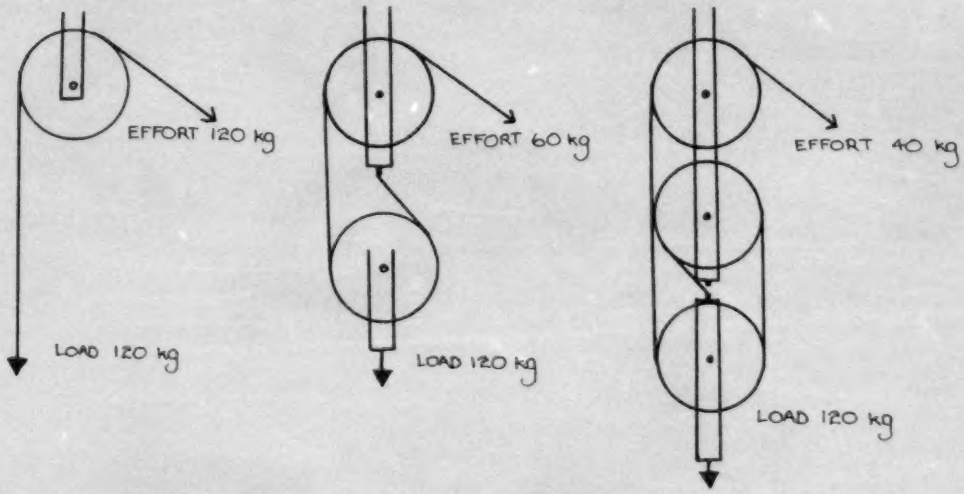


Which statement concerning the objects drawn is correct?

A. All objects will accelerate at the same rate.
B. Objects 1, 2 and 3 will accelerate, but object 4 will remain stationary.
C. Object 3 will accelerate, objects 1, 2 and 4 might accelerate.
D. Objects 2 and 3 will accelerate, 1 and 4 will move with constant velocity.

C3. 606

Study the following diagrams. These show different pulley systems a student used to find the effort needed to move a load of 120 kg.

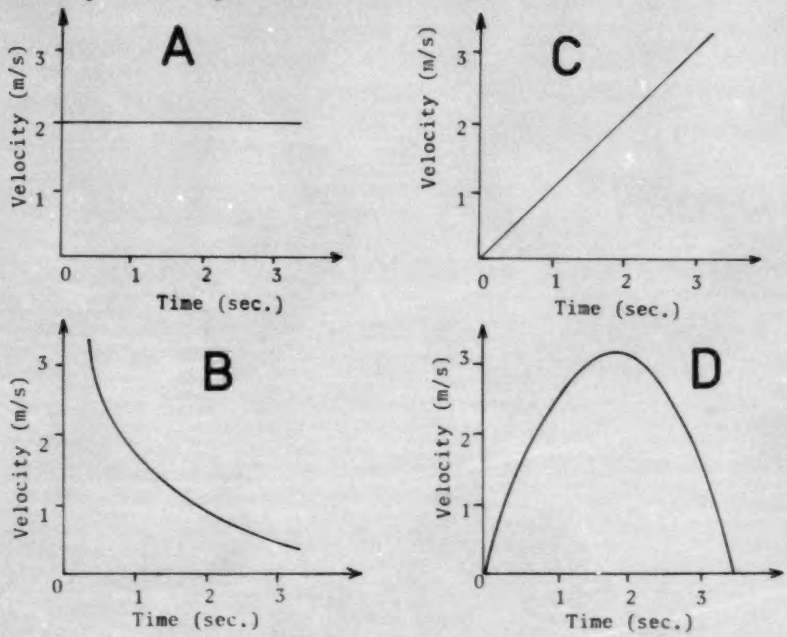


Using the information above, if he wished to move the load of 120 kg. using an effort of only 20 kg. he **would** need a system with

A. 4 pulleys.
B. 6 pulleys.
C. 8 pulleys.
D. 10 pulleys.

B3. 607

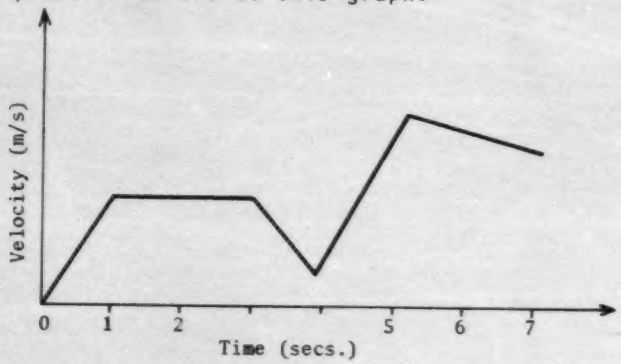
The graphs below show the motion of four objects of equal mass plotted against time.



Which object has the greatest kinetic energy at time 2 seconds?

D4. 608

The next question refers to this graph.



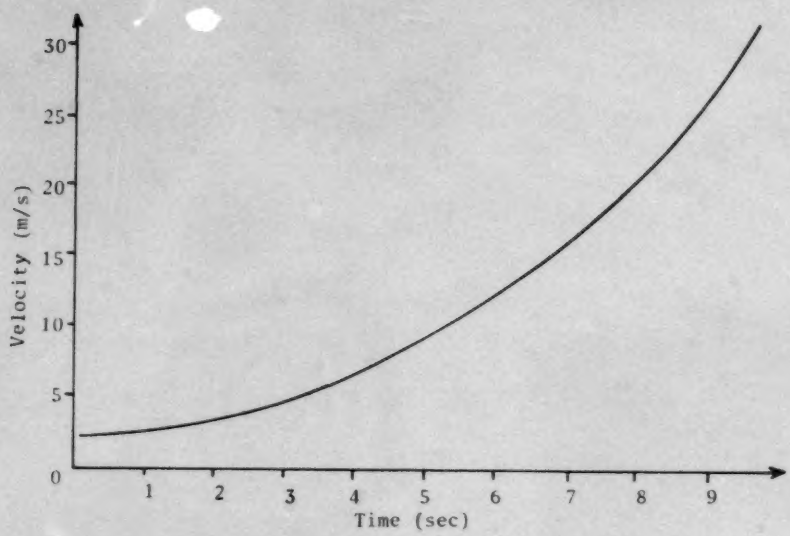
The graph shows the velocity of a car plotted against time for a short part of its journey.

During which period of time was the car travelling with constant velocity? Between

A. 0 and 1 second.
B. 1 and 3 seconds.
C. 3 and 4 seconds.
D. 5 and 7 seconds.

B4. 609

The graph below shows the motion of an object plotted against time.

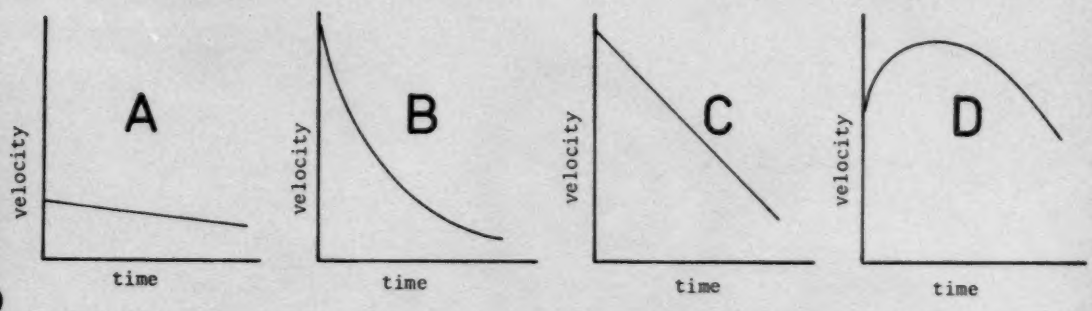


How fast was the object moving, in m/s, at time 7 seconds? Approximately

A. 3 m/s. B. 10 m/s. C. 15 m/s. D. 20 m/s.

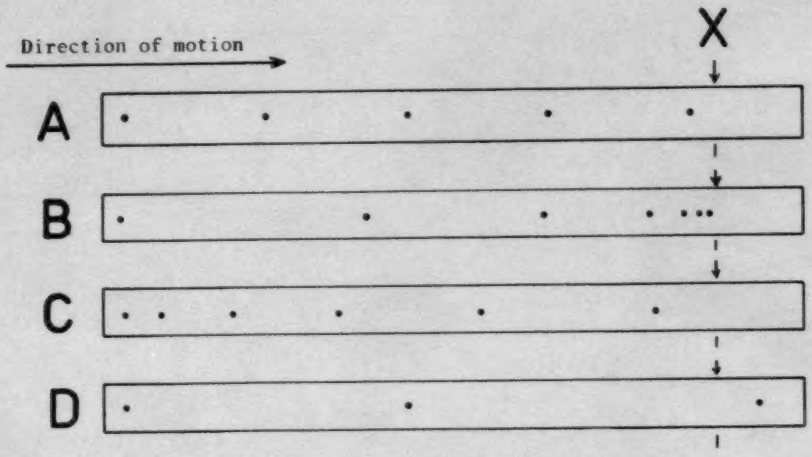
C5. 610

Consider the graphs drawn below. These show the velocities of four cars plotted against time. If the scale on each graph is the same, and each car continues with the same motion, which one will stop first?



C2. 611

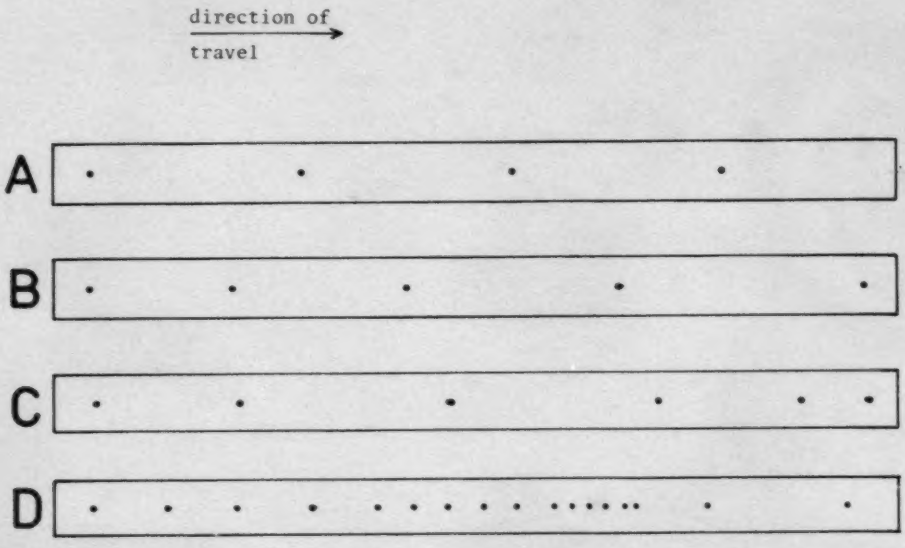
The diagrams below show the motion of four objects, each with the same mass, as recorded on tape during a "ticker-tape" experiment.



Which object would have the most kinetic energy at the instant shown by "X"?

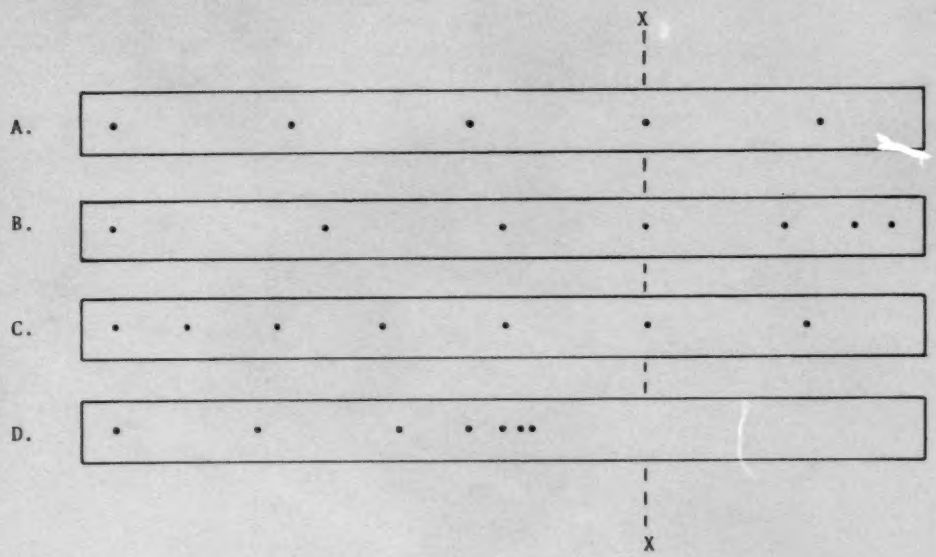
D1. 612

The diagrams below show the motion of four different cars in an experiment using "ticker-timers". If each car slowed down at the same rate which would stop first?



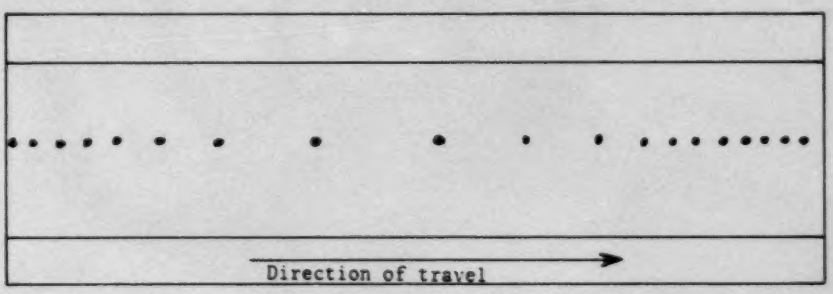
C2. 613

The diagrams show oil drops on a road which were left by four different cars. If the oil in each car dripped at the same constant rate, and all cars were travelling from left to right, which car was travelling fastest at the instant marked 'X'?



A3. 614

A car with a leaky radiator loses a drop of water at regular time intervals. Along a straight stretch of road the pattern of splashes appears as shown in the diagram.

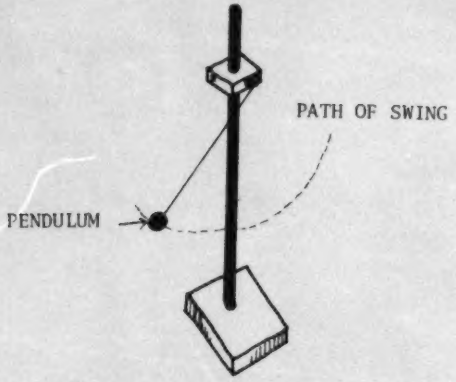


The pattern indicates that, on the stretch of road, the car

A. is moving with a constant acceleration throughout.
B. is moving with a constant velocity throughout.
C. must have stopped and started several times.
D. speeded up then slowed down.

D.5 615

The next question refers to this diagram.

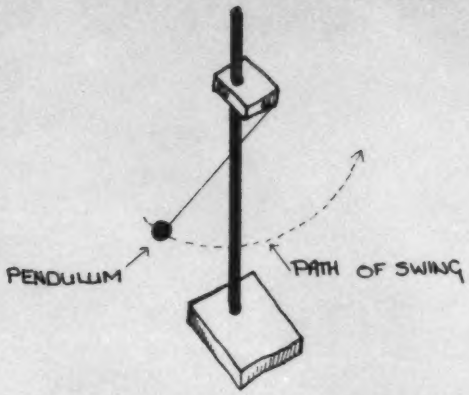


The diagram above illustrates a pendulum set up for an experiment. The pendulum was allowed to swing and the number of full swings occurring in each minute was recorded. The string was then shortened and the observations repeated. The results are shown in this table:

String Length	Number of full swings / minute			
	Trial 1	Trial 2	Trial 3	Average
Long string	46	48	47	47
Short string	64	62	63	63

If you were to shorten the string length still further, which of the following sets of results A, B, C or D would you expect to get?

	Trial 1	Trial 2	Trial 3	Average
A.	30	28	32	30
B.	80	78	76	78
C.	46	48	47	47
D.	30	50	70	50



The diagram above illustrates a pendulum set up for an experiment. The pendulum was allowed to swing and the number of full swings occurring in each minute was recorded. The string was then shortened and the observations repeated. The results were tabulated as below:-

String Length	Number of full swings / minute			
	Trial 1	Trial 2	Trial 3	Average
1.0 m	29	31	30	30
0.6 m	38	40	42	40
0.4 m	50	50	50	50
0.2 m	72	70	68	70

From these results you could correctly conclude that the

A. larger masses produce greater rates of swing.
B. length of the pendulum has no effect on rate of swing.
C. mass of the pendulum has no effect on rate of swing.
D. small pendulum lengths produce greater rates of swing.

D4. 617

A car travelling at a constant speed of 60 kilometres per hour passes the corner of a street which is 300 metres from a pedestrian crossing just as a woman steps on to the crossing. How long does she have to cross the road before the car reaches the crossing?

A. 5 minutes B. 3 minutes C. 50 seconds D. 18 seconds.

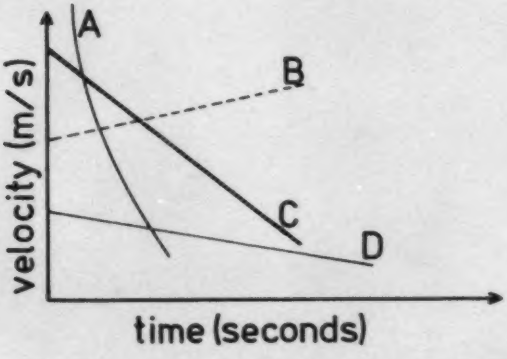
D2. 618

A sports car has half the mass of a family saloon car but both have motors which can exert the same force. If the drivers exert both motors to the fullest from a rest start then

A. the saloon should accelerate faster because it has a greater mass.
B. the sports car should accelerate faster because it has a smaller mass.
C. both cars will accelerate at the same rate because they are experiencing the same force.
D. the car with the better driver will accelerate faster.

B.3 619

This graph shows the velocity of four cars plotted against time.



Which car is slowing down at the greatest rate?

A3. 135 620

The energy available from foods and drinks is measured in CALORIES. Soon the KILOJOULE will be used instead of the CALORIE. We know that 4 KILOJOULES equal 1 CALORIE.

Examine the labels on the cans drawn below.

X

Y

From the information on the labels which of the following is a true statement?

A. X contains more lemonade than Y.
B. A glassful of lemonade from X will provide less energy than the same size glassful from Y.
C. Lemonade from X will taste better than lemonade from Y.
D. The energy content of the lemondade in both cans is the same.

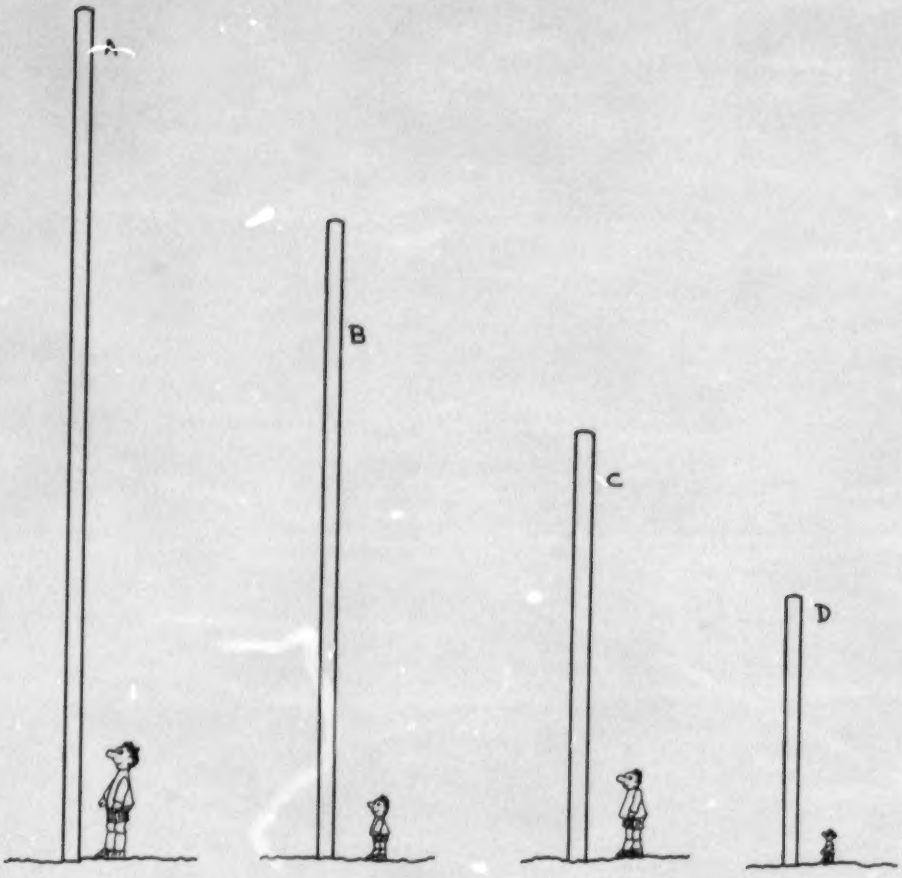
D5. 621

What unit is used to measure air pressure in tyres?

A. Celsius degrees.
B. Kilograms.
C. Pascals.
D. Newtons.

C1. 622

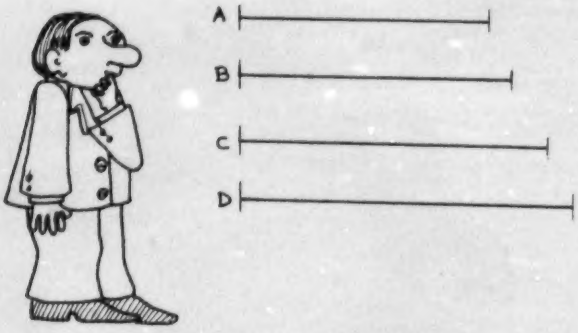
If the people drawn below are <u>all</u> two metres high, which flagpole is the highest?



B3.

623

Which line drawn below is as long as the man is tall?



C5.

624

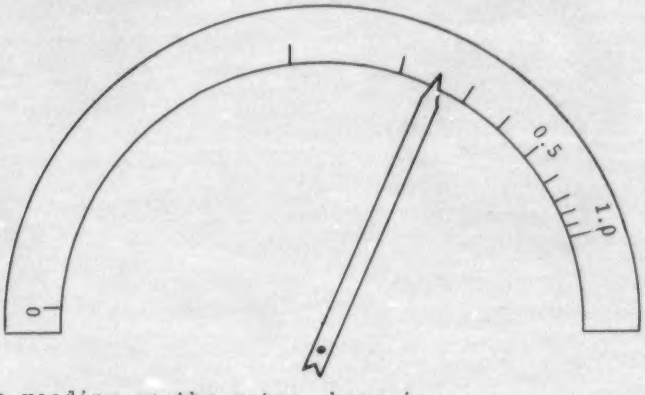
An altimeter is constructed in a similar way to a clock, except that it has 3 hands.

Using this information, what is the reading on the altimeter on the right?

A. 8,350
B. 3,850
C. 5 380
D. 3,580

C1. 625

The next question refers to this diagram.

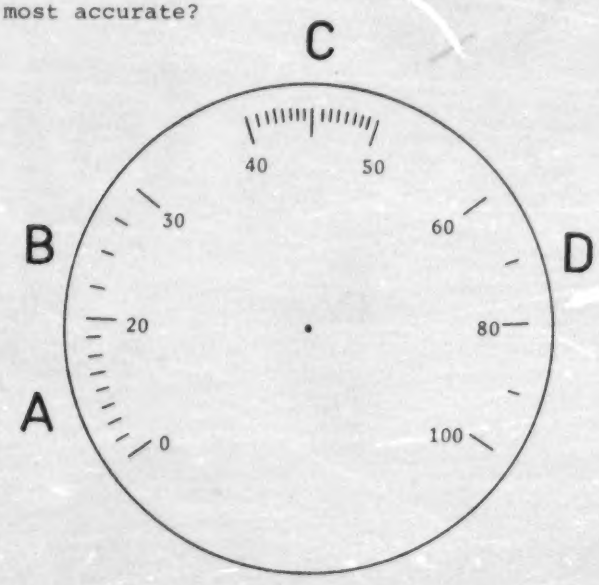


The reading on the meter above is

A. 0.115
B. 0.12
C. 0.25
D. 2.5

C3. 626

Which section on the dial of the instrument drawn below would be most accurate?



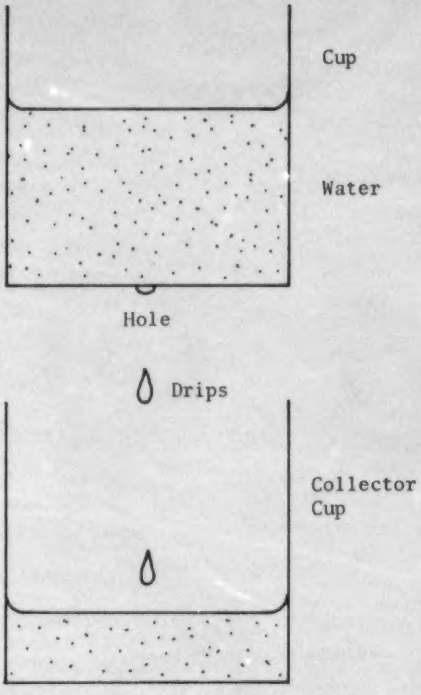
C3. 627

A student made a water clock by letting water drip out of a paper cup through a hole in the bottom.

He noticed that the amount of water shown as collected took 10 minutes to drip from the cup.

How long will it be, before the student's clock "stops"?

A. 15 minutes.
B. 25 minutes.
C. 35 minutes.
D. 45 minutes.



628

B2.

In an experiment to determine how quickly water dripped from a container, students made the following measurements.

STUDENT	TIME	NUMBER OF DROPS
BOB	60 secs.	30
PETER	60 secs.	28
MARY	60 secs.	29
JOAN	60 secs.	32

Which student is closest to the most acceptable result, all readings being considered?

A. Bob. B. Peter. C. Mary. D. Joan.

A3.

629

A kilogram is closest to the mass of a

A. match stick.
B. text book.
C. boy.
D. car.

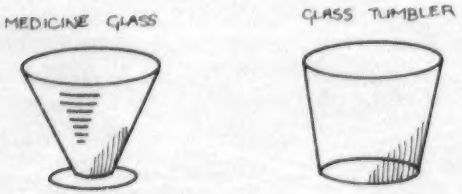
B3 630

A pipette is marked "accurate to B.S. 604 at 20°C". The temperature is given because

A. glass can crack at high temperatures.
B. some liquids expand when heated.
C. some liquids boil when heated.
D. glass expands when heated.

D1. 631

The next question refers to these two diagrams.



Glasses for measuring medicine are often shaped like the one above. The probable reason why they are not shaped like an ordinary glass tumbler is that

A. people will be less tempted to drink out of them.
B. it is an easier shape for the glass makers to construct.
C. the tapered sides make the glass less likely to tip over.
D. the accuracy of measurement of small quantities is increased.

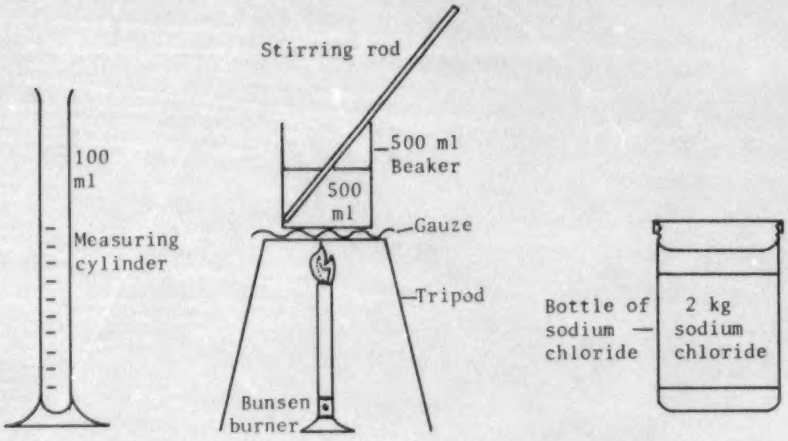
D5. 632

An experiment carries the following instructions:

"Heat 300 ml of water in a beaker and dissolve 5.0 g of sodium chloride".

The diagram below shows some of the apparatus a student could use to do this. One essential piece of apparatus is missing from the diagram. The essential piece of apparatus is

A. crucible tongs.
B. chemical balance.
C. filter paper.
D. boiling chips.

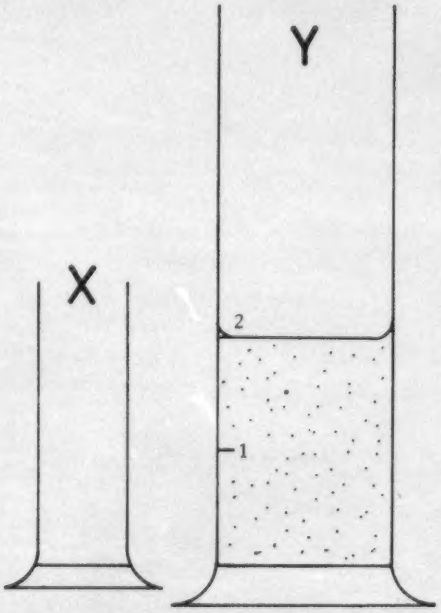


B3.

633

In an experiment to find the volume of container Y drawn right, a student added water from container X marking the level in Y each time.
If the volume of container X is 50 ml, what is the volume of container Y (in ml)?

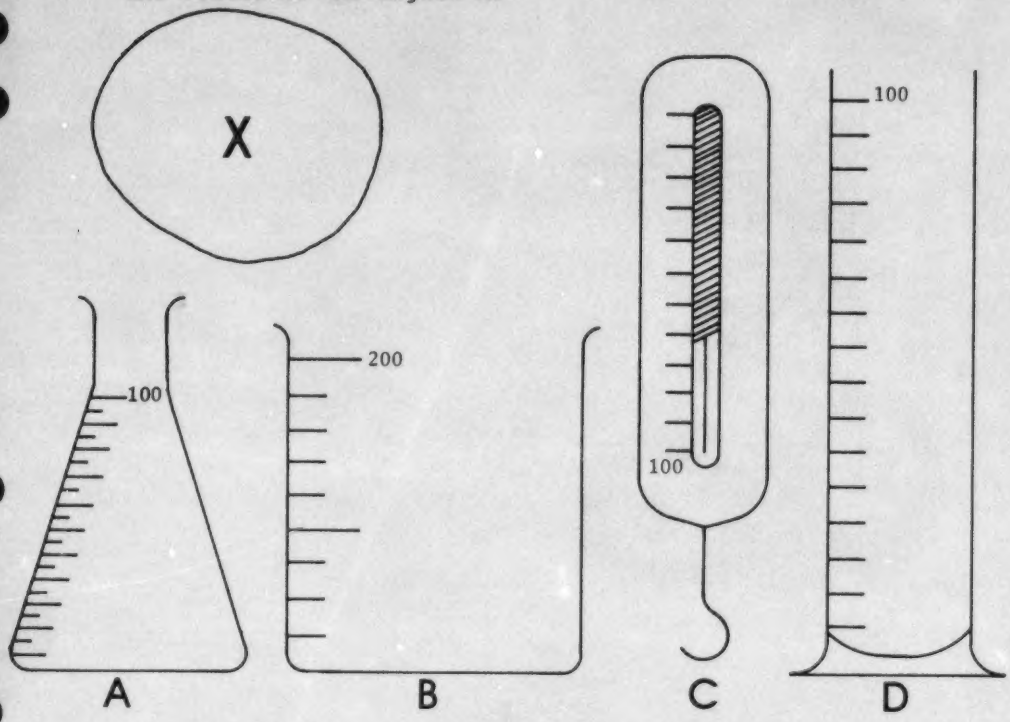
A. 2
B. 5
C. 250
D. 500



C4.

634

The diagram below shows an object X and four pieces of apparatus, all drawn to the same scale. Which piece of apparatus would give the most accurate measurement of the volume of the object X?



B1. 635

Here are the average sizes of some things.
The unit of measurement is the millimicron, which is one millionth of a metre.

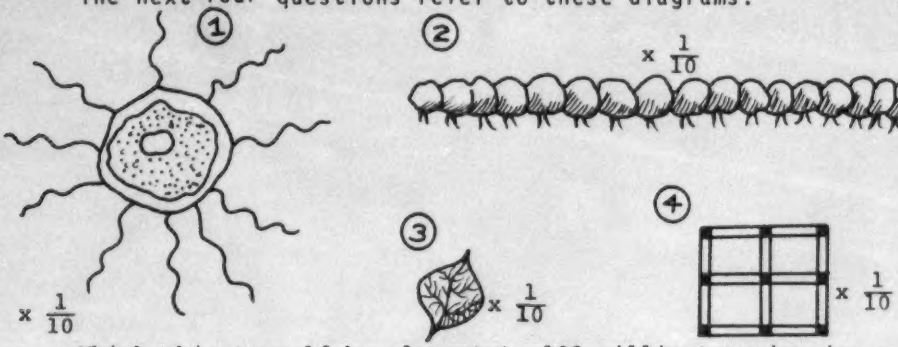
THING	AVERAGE LENGTH (in millimicrons)
small animal cell	9,000
wavelength of yellow light	600
pleuropneumonia organism	150
average virus	60
largest known chemical molecule	22

Some scientists are not sure whether to classify viruses as living or non-living things.
On the basis of the information in the table, we can say that viruses

A. are living things.
B. are non-living things.
C. could be either living or non-living things.
D. are living because they cause diseases.

C3. 636

The next four questions refer to these diagrams.



Which object would be closest to 100 millimetres in size, life size?

C1. A. 1 B. 2 C. 3 D. 4

637

How long, in millimetres, would object (2) be life size?

D1. A. 10 B. 90 C. 450 D. 900

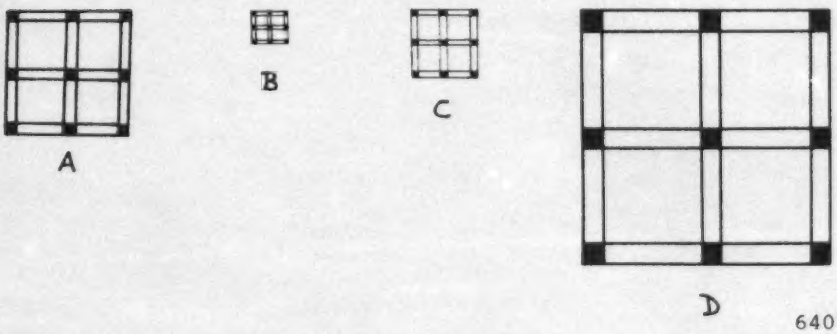
638

Which object would be <u>smallest</u> when looked at life size?

C2. A. 1 B. 2 C. 3 D. 4

639

If object (4) was to be redrawn to a $\times\frac{1}{5}$ scale, which diagram best represents the correct drawing?



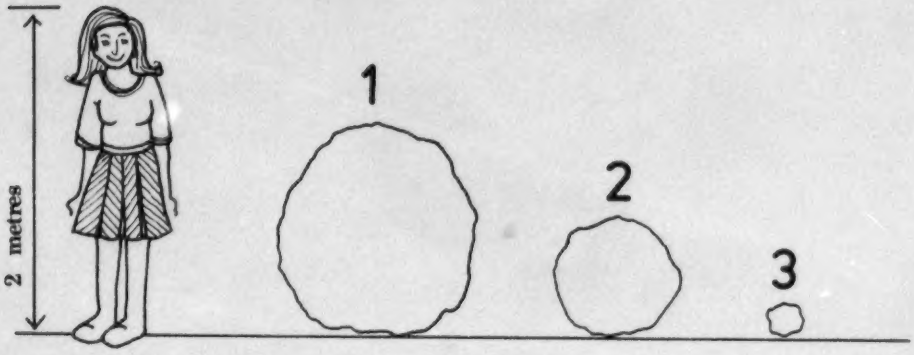
D2.

640

The table on the right shows names of several particles which are found in sedimentary rocks.
The figure drawn below is two (2) metres tall.

SIZE (mm)	PARTICLE
> 520 mm	BOULDER
64 - 520 mm	COBBLE
2 - 64 mm	PEBBLE
$\frac{1}{16}$ - 2 mm	SAND

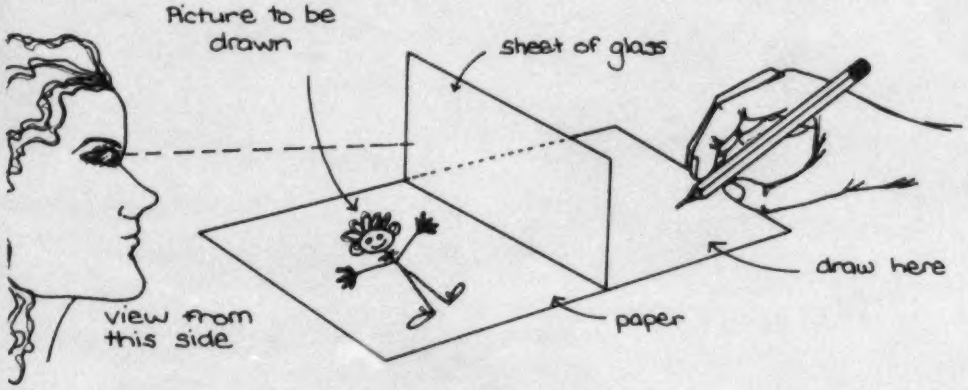
Which of the rocks drawn alongside the figure would be called a <u>boulder</u>?



A. 1 only.
B. 2 only.
C. 1 and 2 only.
D. 1 and 2 and 3.

C1. 641

A picture can be "traced" using the apparatus shown below.

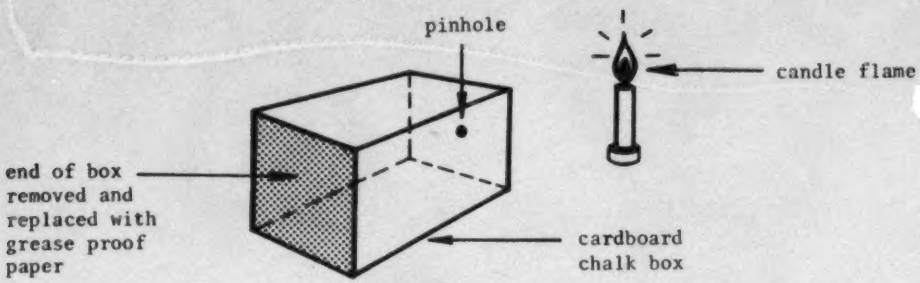


The "tracing" drawn by this method will be different from the original drawing as it will be

A. smaller.
B. larger.
C. up-side-down.
D. back-to-front.

D3. 642

The next question refers to this diagram:

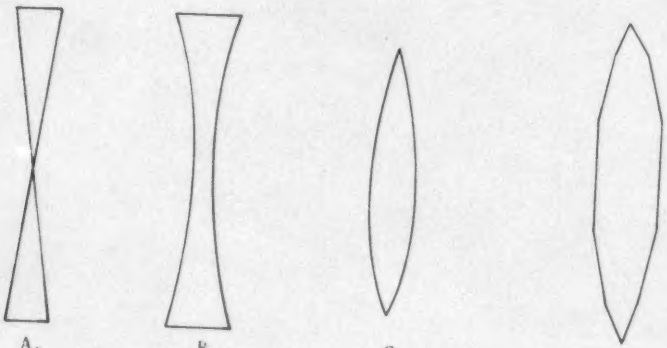


A boy set up a chalk box as shown in this diagram. When he looks at the outside of the greaseproof paper, in a dimly lit room, he will see:

A. an image of the candle upside down
B. nothing because there is no lens in the box
C. an image of the candle the right way up
D. whatever there is in the room beyond the candle

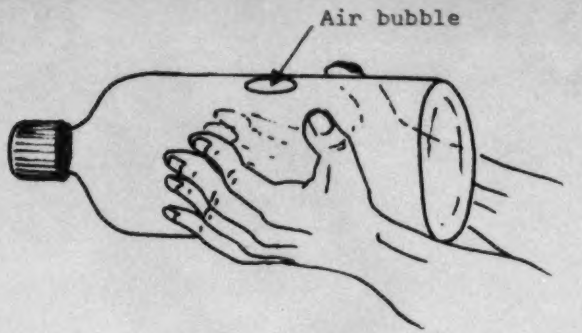
A3. 643

The diagrams below represent the cross sections of circular pieces of glass. Which shape of these pieces of glass would give a well focused magnified image of a very small insect.



C3. 644

The next question refers to this diagram.

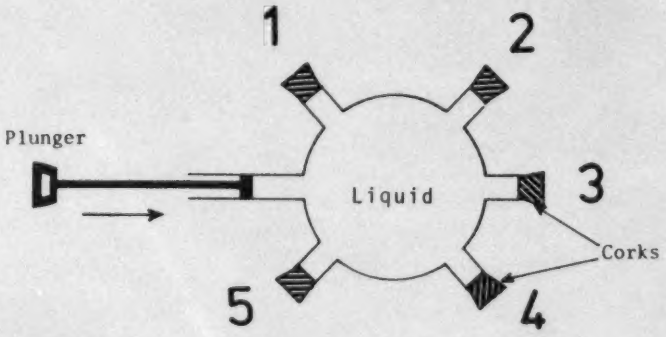


A student squeezed the sides of a clear plastic bottle. The top was tightly sealed on. The bubble in the bottle would

A. get smaller.
B. get bigger.
C. stay the same size.
D. dissolve in the water.

A1. 645

Consider the diagram below.



The diagram shows a container with five identically corked holes of equal size. If the plunger is pushed sharply in, what is most likely to happen?

A. Plug 3 will blow out only.
B. Plug 3 will blow out first, followed by plugs 2 and 4.
C. All 5 plugs will blow out.
D. Plugs 2, 3 and 4 will blow out first, followed by 1 and 5.

C3. 646

The next three questions refer to this information.

mass object in air	50g
mass object in water	40g
mass object in liquid X	45g

The volume of the object referred to by this information is closest to

A. 5 cc. B. 10 cc. C. 15 cc. D. 20 cc.

B1. 647

The density of the object is closest to

A. 2 g/cc. B. 4 g/cc. C. 5 g/cc. D. 10 g/cc.

C2. 648

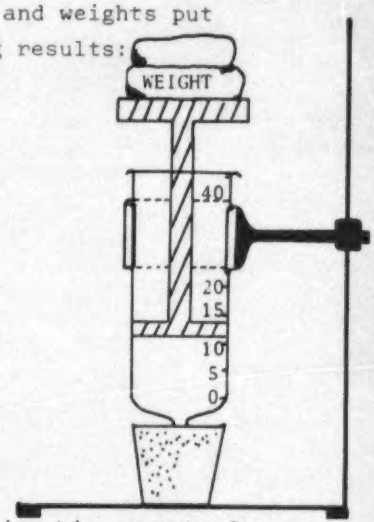
The density of liquid X is closest to

A. 0.5 g/cc. B. 2 g/cc. C. 2.5 g/cc. D. 5 g/cc.

A1. 649

A gas was enclosed in a syringe as shown and weights put on top. A student obtained the following results:

Number of Weights	Volume of Gas in syringe (mls)
1	21
2	20
3	18
4	17
5	14
6	2



The last result appears wrong. When writing his report of the experiment, the student should

A. report all results, noting that the last result is unexpected.
B. leave out the last result as it spoils the experiment.
C. alter the last result, using other results as a guide to what the volume should be.
D. ask others what results they got and then change the last result.

A.4 650

A native of the planet Xenos tried to sell to a visiting space traveller an ornament which he said was pure gold.

The traveller suspected he was being cheated, so he conducted the following experiment.

He weighed the ornament, and then took equal weights of gold and silver and found the volume of all three. His results were

	Volume	Weight
Ornament	8 units	10 units
Gold	7 units	10 units
Silver	13 units	10 units

He could correctly conclude that

A. mainly gold with a little silver added.
B. mainly silver with some gold added.
C. approximately 50-50 gold and silver.
D. 7 parts gold to 13 parts silver.

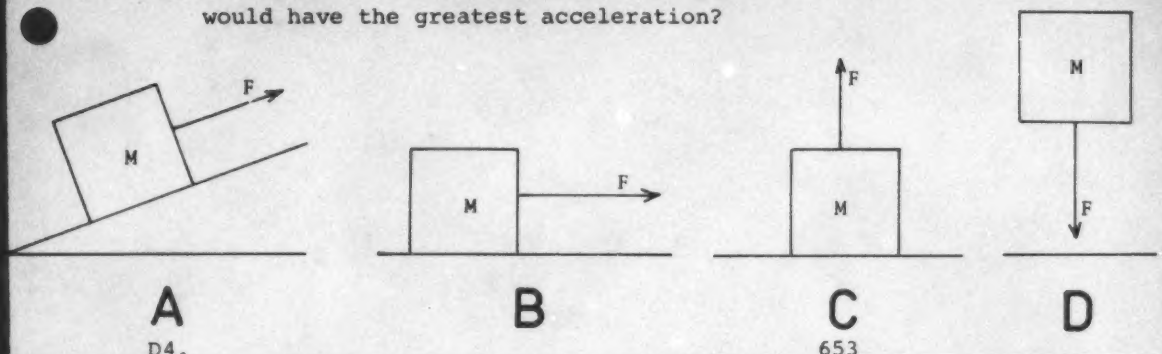
A2. 651

A partially inflated balloon is seen to inflate more as it is taken up a very high mountain. This is most probably because

A. air particles diffuse through and collect in the balloon.
B. air particles diffuse out of the balloon.
C. air pressure outside the balloon becomes noticeably less.
D. air pressure outside the balloon becomes noticeably greater.

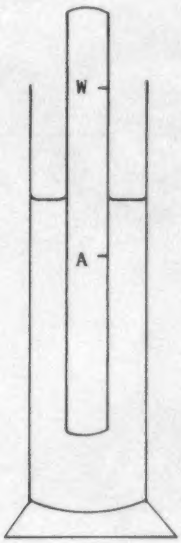
C3. 652

Each of the objects shown below has identical mass. If identical forces acted on each of the objects, which would have the greatest acceleration?



D4.

653



The diagram on the left shows a "paddle-pop stick hydrometer" with graduation marks for water (W) and acid (A) shown. The density of the acid used was 1.6 grams per cubic centimetre.

The table below gives the density of four liquids, one of which is in the measuring cylinder:

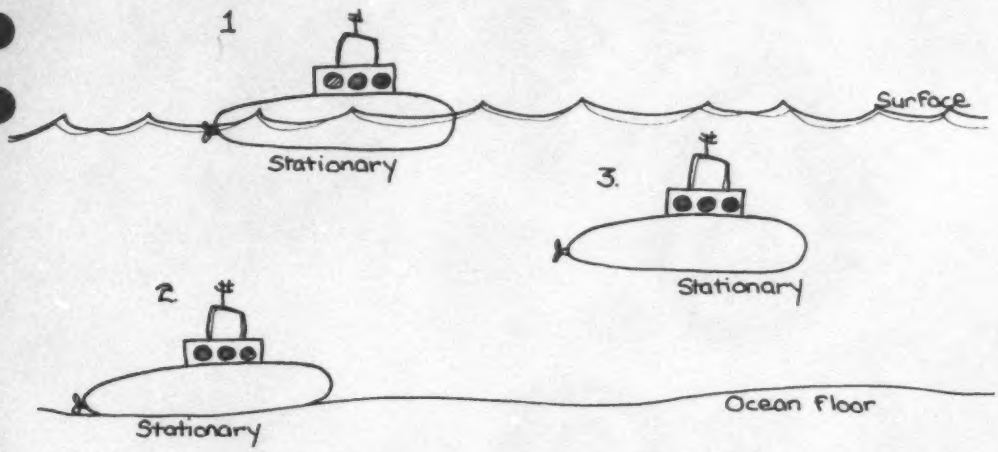
SUBSTANCE	DENSITY (g/cc)
A	1.2
B	1.4
C	1.6
D	1.8

Which substance is in the measuring cylinder?

B1.

654

The next question refers to this diagram.

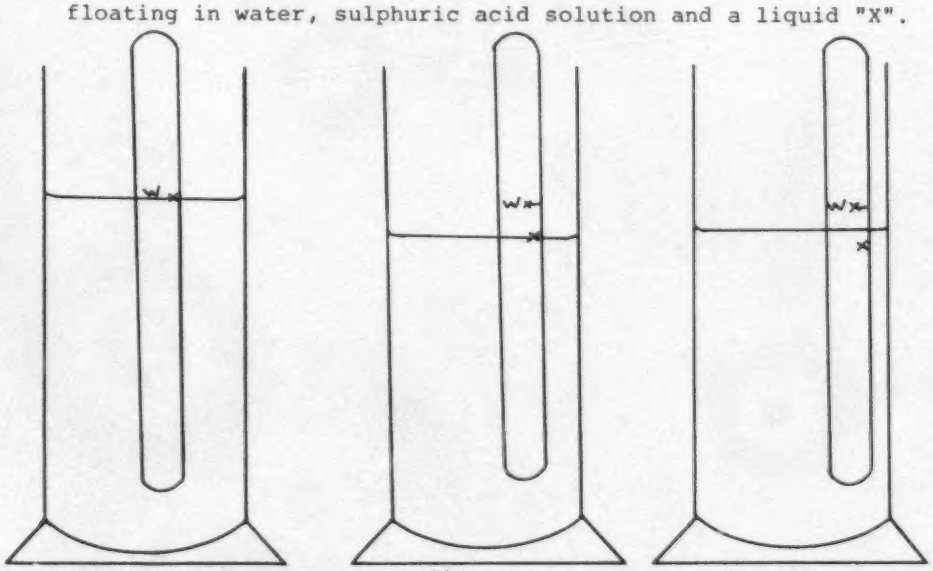


Which of the submarines drawn above must have an average density equal to that of water?

A. 1 and 3 only.
B. 1 and 2 only.
C. 3 only.
D. 1 and 2 and 3.

C4. 655

The diagrams below show a "paddle-pop stick hydrometer" floating in water, sulphuric acid solution and a liquid "X".



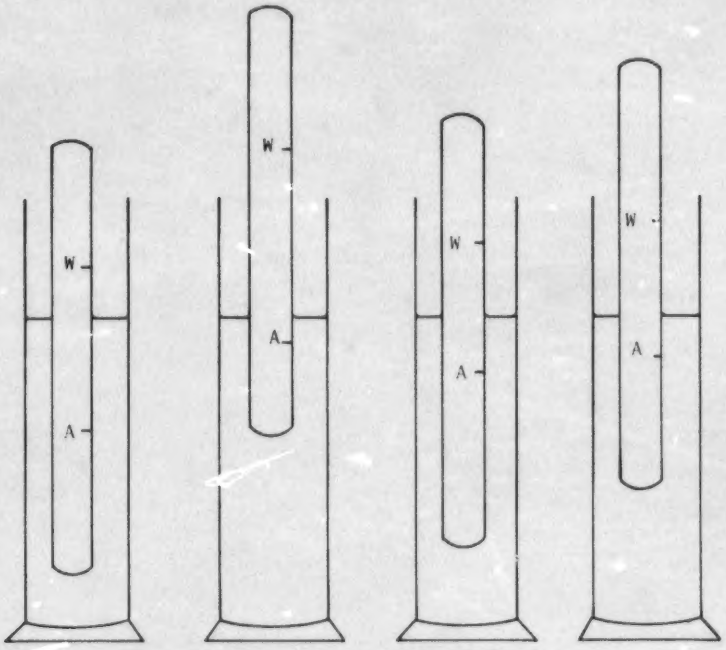
The density of liquid X in g/cc is closest to

A. 0.6 B. 0.9 C. 1.2 D. 1.6

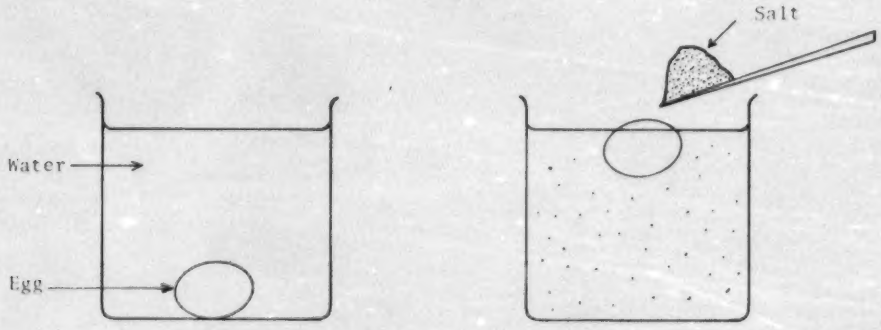
C3. 656

The diagrams show four "paddle-pop stick hydrometers" in four liquids. On each is shown the graduation mark for water (density 1 g/cc) and an acid (density 1.6 g/cc).

Which container contains a liquid of density 1.4 g/cc?



D1. A B C D 657

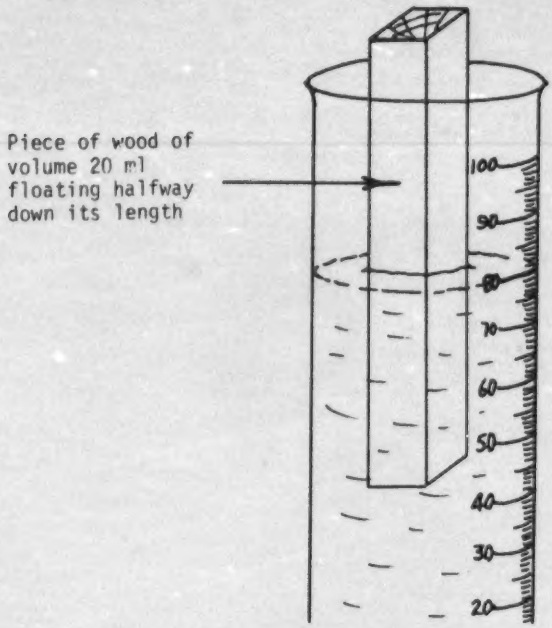


A student noticed that an egg sank in water, but as salt was added to the water, the egg began to float.
Which statement below best explains this?

A. The egg is denser than the water when salt is added.
B. Salt reacts with the eggshell forming a gas which buoys the egg up.
C. Salt water is more dense than unsalted water.
D. The egg slowly absorbs salt by osmosis and rises.

C3. 658

The next question refers to this diagram.



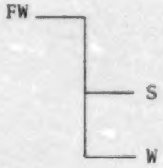
The diagram above shows a length of wood of volume 20 ml floating halfway down its length in a measuring cylinder of water. The volume of water in the measuring cylinder is -

A. 80 ml
B. 70 ml
C. 60 ml
D. 50 ml

B3. 659

The Plimsoll line marks the safe water level to which a ship may sink when it is loaded.

It is painted on the side of a ship and may look like:



FW = level in fresh water.
S = level in salt water in summer.
W = level in salt water in winter.

The three different levels are to allow for

A. different loads which the ship may carry.
B. changes in weather conditions which affect the ship's stability.
C. heavier loads sinking further into the water than lighter loads.
D. differences in water density on different occasions.

D3. 660

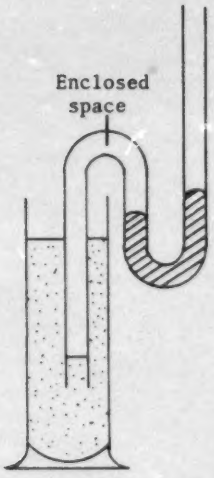
A pin can be made to "float" on the surface of water if it is carefully lowered onto the surface.

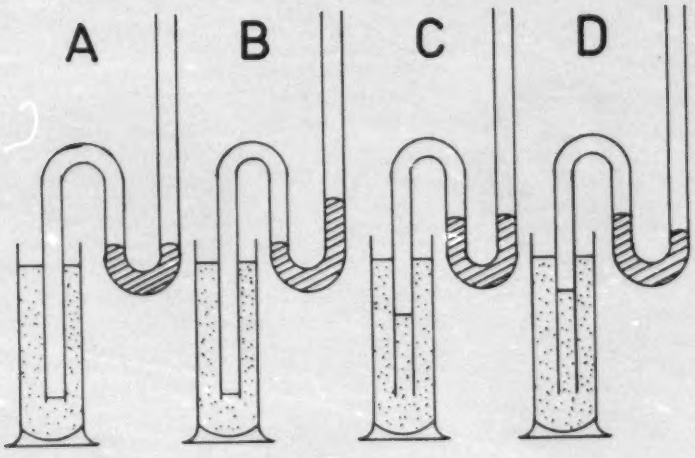
Four beakers were set up-with pins "floating" in them, and a substance was added carefully to each. Which substance would be most likely to cause the pin to sink?

A. Detergent.
B. Ice.
C. Oil.
D. Mercury.

A1. 661

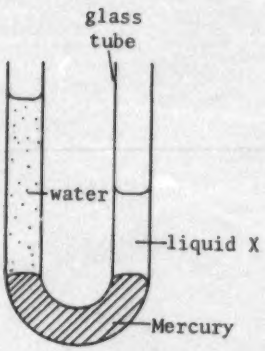
Some air was added to the enclosed space in the apparatus drawn (left). Which diagram (below) best shows what could happen as a result of this?





B2. 662

From the information presented by the diagram on the right, what is the most probable density of liquid X?



A. 0.5 g/cc.
B. 1.0 g/cc.
C. 1.5 g/cc.
D. 2.0 g/cc.

D1.

663

Which weighs more - a bottle full of cold water or the same bottle full of hot water?

A. Cold water because it has lost some of its dissolved gases.
B. Cold water because it is denser than hot water.
C. Hot water because it has lost some of its dissolved gases.
D. Hot water because more can fit in the same sized bottle.

B3.

664

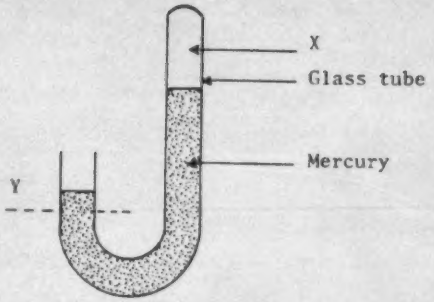
Which object in the table below would be most likely to float in methylated spirits, density 0.8 g/cc?

OBJECT	MASS (g)	VOLUME (ml)
A	5	8
B	10	10
C	15	12
D	20	14

665

A3.

Which statement about the apparatus shown on the right is TRUE?



A. The set-up of the apparatus is not possible as the mercury would run out of the open end.

B. If the tube were punctured at level Y most of the mercury would run out of the apparatus.

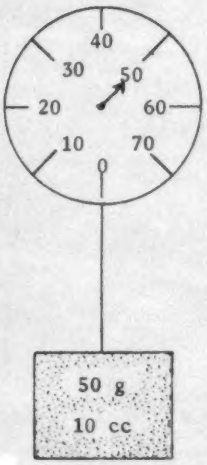
C. The system is stable only if space "X" is a vacuum, otherwise the mercury would spill out.

D. If the atmospheric pressure increased, space "X" would decrease in size.

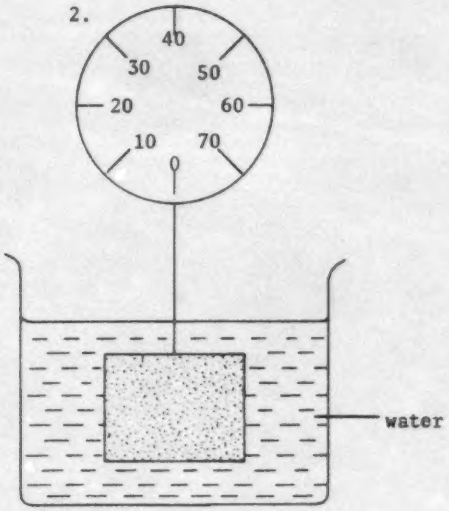
D1.

666

1.



2.



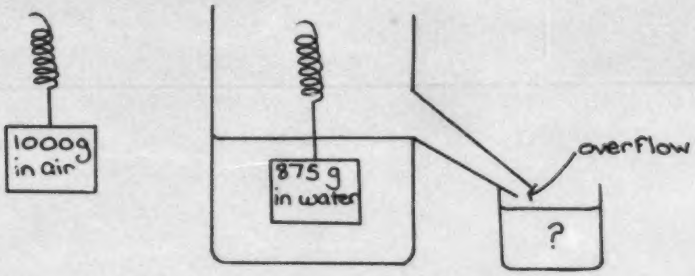
The object suspended from balances 1 and 2 above has a volume of 10 cc. Its mass, as indicated on scale 1 is 50 g.

What would be the reading on scale 2?

B1. A. 10 g B. 40 g C. 50 g D. 60 g

667

The diagrams show an object weighed in air and submerged in a container of water.
Before the object was placed in the container of water, the water level was the same as that shown.

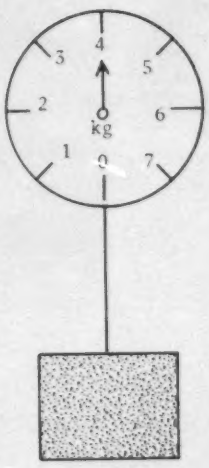


How much water would be in the small overflow container?

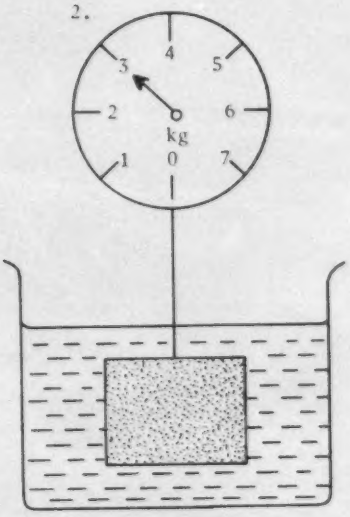
A. 100 ml. B. 125 ml. C. 875 ml. D. 1000 ml.

B3. 668

1.



2.



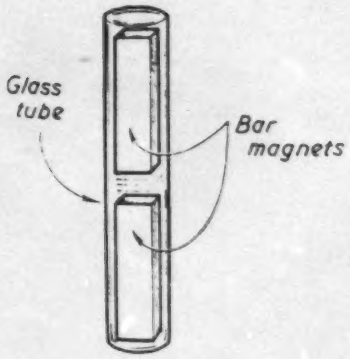
The mass of an object in air is shown on scale 1 and its mass in water on scale 2.

What is the volume of the object?

A. 1 cc B. 10 cc C. 100 cc D. 1000 cc

D1. 156 669

Consider the following experiment.

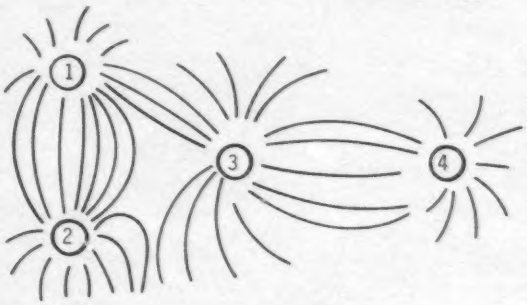


The best explanation for the experiment is that

A. antigravity has been discovered.
B. magnets exert a force of attraction.
C. the two ends of the magnets are different.
D. two similar ends will repel.

D4. 670

Observe the following diagram of a magnetic field.



Which of the sequences of magnetic poles tabulated would produce the pattern shown in the above diagram?

	1	2	3	4
A.	S	S	N	N
B.	N	S	N	S
C.	S	N	S	N
D.	N	S	S	N

D1. 671

A telescope mounted in a satellite orbiting Earth should obtain a clear view of the stars because

A. the sun would not be shining directly on it.
B. the atmosphere would not disturb the starlight.
C. dust would not collect on the mirror.
D. the mirror would not bend due to weightless conditions.

B2. 672

Astronomers have spent many years studying the changes in the objects seen in the sky. They have found that some of these changes follow a regular, predictable pattern, and some do not seem to follow any pattern.

One of these events which does not seem to follow a pattern, and which cannot be predicted by astronomers, is

A. a meteor blazing through the atmosphere.
B. the moon moving into the earth's shadow.
C. a planet disappearing from view behind the moon.
D. the moon passing between the earth and the sun.

A4. 673

During the Apollo missions to the moon, it was important to maintain continuous communication with the astronauts. To do this, communication centres were established in Australia, Europe and North America. These locations were chosen largely because

A. they were widely separated.
B. at least one of the three centres could maintain direct line of sight with the rocket.
C. each of the communication centres was in a technically advanced country.
D. a full moon would be visible from at least one of the centres at all times.

B3. 158 674

When the Viking I probe landed on Mars the probe found the atmosphere contained 4 per cent nitrogen and water vapour. For any life, as we know it, to exist on Mars there would also have to be evidence of

A. oxygen or oxides.
B. ammonia or ammonium salts.
C. carbon compounds or carbon dioxide.
D. hydrogen or hydrides.

C1. 675

"Peering into the heavens is like looking back into time, and some of the stars which astronomers see may no longer exist." This statement is probably true because

A. light travels slowly from distant stars.
B. during the time the light travels, the stars change.
C. "dead" stars still give some light.
D. we cannot clearly detect the light from distant stars.

B2. 676

"The Universe never really changes - it just goes round and round, in a series of different cycles."

Which of the following observations does NOT support this statement?

A. Sometimes new stars appear in the sky.
B. Summer days, on earth, are longer than winter days.
C. Some planets take longer than the earth to circle the sun.
D. Sometimes comets pass close to the earth.

A2. 677

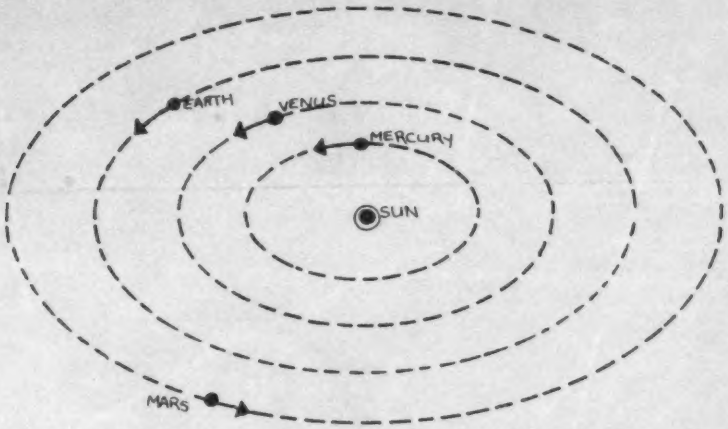
On July 20, 1976 Viking 1 landed on Mars.
"Even before the biologists had begun their tests, Viking 1 had shown that, as Dr. McElroy put it: 'the elements of the chemistry set are there. We have water, we have carbon, we have nitrogen, we have sunlight. The only real remaining question is whether the Great Chemist was there putting the elements together in the right way.'
On that summery day, the air temperature ranged from -86°C shortly after dawn to a mid afternoon high of -31°C."

On Earth which of the following organisms would be most likely to be able to survive these conditions?

A. Marine plankton.
B. Man-like mammals.
C. Bacterial micro-organisms.
D. Algae.

C3. 678

The next question refers to this diagram of part of the Solar System. The diagram is NOT to scale.



If you wished to see Venus early in the morning, from the diagram, you can say that you should look in the

A. eastern sky.
B. western sky.
C. northern sky.
D. southern sky.

A3. 679

Life on earth is influenced by the movement of other objects in the Universe. The most obvious example of this is the effect of the movement of

A. the sun on the weather.
B. the moon on the tides.
C. the sun on plant growth.
D. the planets on the seasons.

B1. 680

Shadows are much "deeper" (darker) on the Moon than on the Earth.
This is because

A. there is no atmosphere on the Moon.
B. less light falls on the Moon.
C. the Moon is closer to the Sun.
D. Earth receives light from both Sun and Moon.

681

A1.

Consider an astronaut in space making repairs to his spaceship. Which of the following tools would be easiest to use without special precautions?

A. Hammer.
B. Pliers.
C. Saw.
D. Screwdriver.

B2. 682

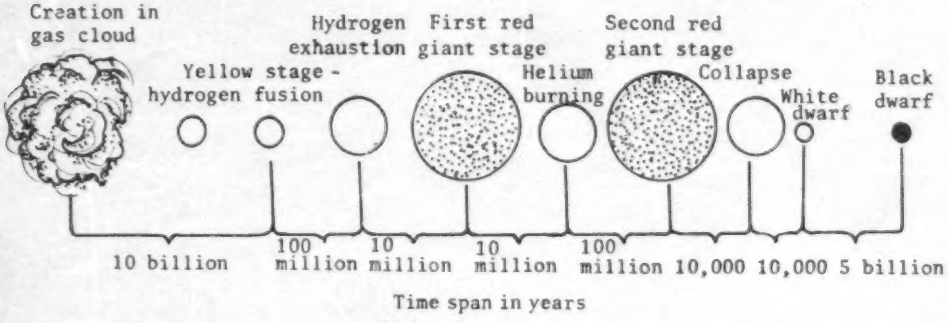
Which one of the following changes in the universe happened most recently?

A. The formation of our galaxy.
B. The "big bang".
C. The formation of Mars.
D. The birth of our sun.

C2. 683

The next two questions refer to this diagram. It shows one theory of how stars like our sun are formed and destroyed.

Evolution of a Sun-Size Star



If the theory is correct, about how long has our sun probably existed?

A. 5 billion years.
B. 10 billion years.
C. 10 billion + 100 million years.
D. 10 billion + 110 million years.

B1. 684

Betelgeuse, in the constellation 'Orion' is known as a "red giant". Its age must be about

A. 10 billion + 110 million years.
B. 10 billion + 220 million years.
C. either (A) or (B).
D. none of the above.

C1. 685

Books about astronomy often tell you how far it is from the earth to other objects in the sky. Some distances are not given because they keep on changing and so there would be no point in putting them in.
Of the following, the distance which keeps changing so much that it is not usually included in books is the distance from earth to

A. the moon.
B. the sun.
C. the planet, Venus.
D. the star, α-Centauri.

C1. 686

Of the following true statements, three can rest on the student's own observations, and one must be accepted on some other authority.

Which statement must be based on some "other authority"?

A. Light from the sun consists of many colours.
B. The sun is approximately one hundred and fifty million kilometres from earth.
C. The sun radiates heat and light energy.
D. The shadow cast by the sun is shortest at noon.

B3. 687

The next question refers to this table.

Planet	Year length in Earth units	Mass compared with the Earth	Number of moons
Mercury	88 days	0.05	0
Venus	250 days	0.8	0
Earth	365 days	1.0	1
Mars	687 days	0.1	2
Jupiter	12 years	320	12
Saturn	30 years	95	9
Uranus	84 years	15	5
Neptune	165 years	17	2
Pluto	250 years	0.8	0

The table above shows that the inner planets move much faster in their orbits of the Sun than the outer planets. This is because they

A. have a much higher temperature than the outer planets.
B. have to defeat a greater "tug" of solar gravity.
C. are much smaller than the outer planets.
D. have no natural satellites (or moons).

B3. 688